Consumption.

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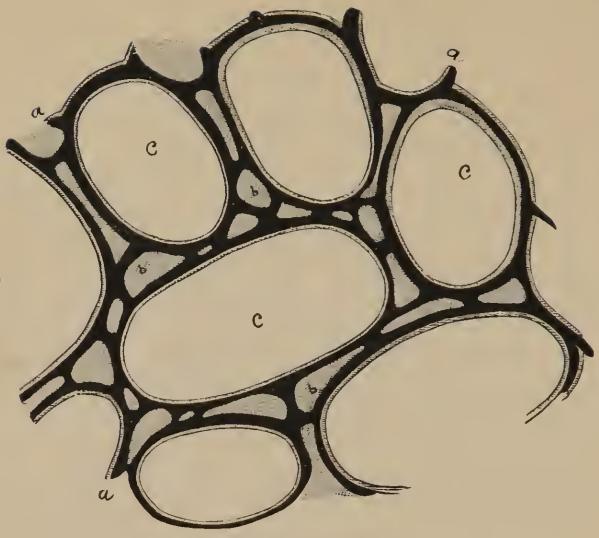

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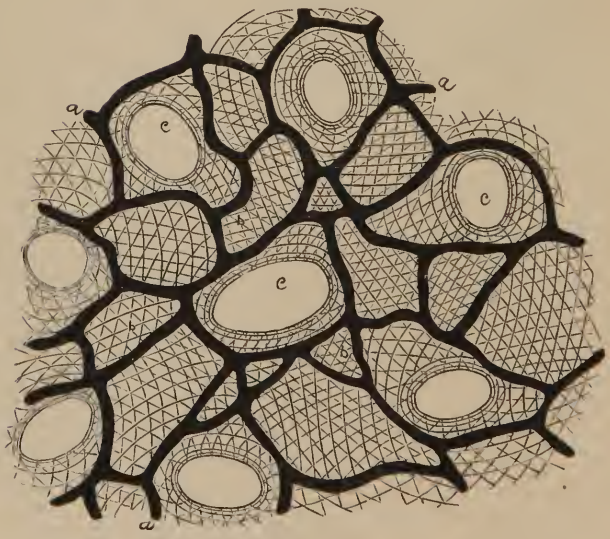

EXPIRATION.

CONSUMPTION

AND ITS TREATMENT

IN ALL ITS FORMS.

BY

DR. CARL BOTH.

THE PRACTICAL APPLICATION OF THE CELLULAR PRINCIPLE, AND THE DISCOVERIES UPON WHICH THIS BOOK RESTS, HAVE BEEN INDORSED BY THE IMPERIAL MEDICAL FACULTY OF VIENNA, AND PUBLISHED IN THEIR OFFICIAL JOURNAL.

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PREFACE.

THERE is scarcely a subject in any department of science where the knowledge is so utterly defective as in the doctrines of Consumption. Without understanding the process of respiration, or with any clear idea of the anatomy of the lungs, medical practitioners prescribe, and prescribe for Consumption, imitating either Niemeyer, or some other meier, send their patients to Florida, Minnesota, or abroad, and tell them what they themselves only too often do not in the least comprehend. To divert the mind of the patient, and to cover this total absence of precise knowledge, the most innocent things are made to serve as scape-goats — especially such as the air, climate, moisture, dust, winds, spores, etc.; all of which, however, are phantoms of empty illusions, which never add an atom of help to the great army of patients, or to the clearing up of the questions involved. We should naturally suppose that anything which would tend to throw light upon the question, would be readily investigated; but strange to say, it is just the opposite. It is a fact, that where humanity is the most defective, there it exhibits its greatest orthodoxy — as a mother generally favors in the greatest degree her most defective child. And it is also a fact, that the great army of physicians are the most sensitive and mistrustful where they are conscious of having the least foundation. And next to this, may be classed the personal vanity and ambition of professors in colleges, who, with great difficulty, have collected a mass of dogmatic sentences, which they put before their confused students as the cream of medicine.

Nothing can be more offensive to these men than to doubt the cor-

rectness, or value of their hard-acquired confusion, while to upset, or demolish it, in reality, is a capital offence.

The author of a book has two points to consider: the *subject* itself, and the *form* in which it is to be represented. The former, generally, commands the value of the book, but upon the latter depends its usefulness. Had this volume been written in strictly scientific language it would have been difficult, if not impossible, to have found a publisher for it, as there is little or no demand for such works in this country. As an illustration: in 1868, the Boston Public Library procured, at my request, a copy of Virchow's Onkology; which, beyond a doubt, is the most classical contribution to medical science extant. In 1872, I had occasion to consult these volumes for reference, when I found there had not been a single call for them. And so long as the medical profession of America consists of allopath and homœopath, etc., instead of being composed of physicians, no very considerable demand for scientific works on medicine can be expected. The object of the majority of medical practitioners is not to become masters of their profession, but simply to satisfy the demands of their patients as regards particular medicines, and thereby to make money. They consequently remain merely as the empty tools of some authoritative professor, or of a doctrine which the less of sense or reason it possesses the more apologists and advocates it has. The particular doctrines of allopathy or homœopathy, have no more to do with medical science, than a boot has with the religious opinions of the maker, as to whether he was a Methodist or a Universalist. The very fact that a man carries, or enrols himself in such a name, is *prima facie* evidence that he has not the least idea of the purpose or of the reality of medical knowledge.

The reader who is conversant with the existing knowledge — the views and theories of Consumption, which are held as a whole, by the profession, will find in the following pages, that all that is usually taught on this subject has been pretty generally rendered obsolete. The views herein developed, have not over them the shade of an experience of two thousand years, nor are they clothed with the venerable toga of that complication of old doctrines formerly called pathology, nor yet do they lean upon the historic or present

authorities, with the opinions of which the old toga is sewed together, and continually patched, presenting at once a curious cloak, composed of much-worn material, which, by time and progress, has become too thin and tattered to conceal the conscious lack of precise knowledge and utter nothingness which it enfolds. The views contained in this volume are presented to the reader, coverless and naked as Nature herself. Instead of resting upon so-called authority, they are based upon anatomy and physiology only, and are entirely original. We therefore find them varying from, and altogether unlike what is now taught, or rather not taught, on this subject in books, or the professional Cathedra. The reader, therefore, need not be surprised if he is told that what now appears before him in a somewhat complete or finished condition was, in its early history or childhood, regarded with suspicion and treated as a vagrant who had neither home nor friends. Though pushed or driven from door to door; nowhere accepted; with sneers and contempt as their constant aliment, and on every hand meeting with blind opposition, these views grew up; but, after being refused almost everywhere at republican doors here for nearly fifteen years, they found their way to the old aristocratic head-quarters — standing to day endorsed and published in Vienna with the stamp of the Imperial Medical Faculty over their brow. Had I then comprehended the difficulties that would accompany an attempt (with a new foundation which had never been practically applied) to work through the chaos of opinions, experiences, dogmas, and systems, which had been accumulating for thousands of years, I should have given up the task. But the confidence of success, and the enthusiasm of youth inspired me to begin, and, supported by eminently practical results, the work was continued.

The diagrams in this volume are not as perfect as they should have been, it being intensely difficult to get them done correctly; but they will suffice to illustrate the views sufficiently so as to be readily comprehended.

The various subjects treated in this volume, as far as possible, have been divested of all technicalities, and rendered in the plainest language, with the especial purpose of showing a mistrustful

laity, that everything scientific and real, no matter how complicated the subject may be, can be brought within the comprehension of every intelligent person. Nevertheless, I do not expect to satisfy everybody, for by far the larger majority demand more than can be truthfully given, thus tempting others to cheat them by professional every-day humbug.

The contents of this volume are especially my own, particular mention having been made of every one whose ideas I have used. To the professional reader I would say that I have tried as sharply as possible to bring to practical bearing the cellular theory, a task which of itself is as difficult as it is new; and if the form in which my results are presented is not the strong classical one in which scientific advances are usually at first presented, it is for the reason that I have been forced to the conclusion that strictly scientific papers are, in general, as little, or perhaps less, understood in America by the majority of the profession than by an educated laity.

Before concluding we would draw the attention of the reader to another point, which should be considered in the judgment of these pages. In the present age, we have entered into a new epoch of intellectual advancement. What at one time was considered scientific knowledge is now known to have been a mixture of theology, philosophy, and a superficial observation of phenomena, resting not upon the absolute laws of nature, but upon belief, sophism, and mysticism. What we now call science did not exist fifty years ago. Then it was not the object of scientists (so called) to expose, but to hide, the emptiness of existing knowledge, which was effectually accomplished by the use of dead languages. Hence, in the works of all the older scholars, we find, instead of absolute definitions, *words* borrowed from the Greek, Arabic, Latin, and other languages, which served admirably to cover the absence or lack of mathematical exactness. It is to Emanuel Kant that we owe the commencement of the era in which we really begin to understand one another, instead of mystifying ourselves. The German philosophy of the last century is the bridge which leads from mysticism to absolute science. This philosophy, though obsolete to-day, having served its purpose, must still be considered the mother of our

present era of science. No sooner had Kant revolutionized the heads of thinking men than it became the object to define every sentence with mathematical clearness. The use of the dead letters and words were avoided, and since then we observe the entire separation of science from theology and mystical philosophy. The dead languages are to-day superfluous, positive facts and absolute reasoning having taken their places. That such a mental revolution as that produced by Kant, cannot in the short period of its existence be general, is easily comprehensible, especially as it sweeps before it old customs and habits of mental lethargy and mysticism, and thereby creates an almost universal opposition. We, therefore, find to-day an actual opposition and conflict between the old and the new. In this fight the old is passive and helpless; the colossal fabrics of former creeds, dogmas or systems, and grandeur, must submit to be cut down by the sharpness of a new age of reason, of absolute science, and of general comprehension. It is true that the followers of the new are but few in comparison with those who follow the old regimé as they are numbered by millions; nevertheless, these few govern the field and reign over the future. The mysterious authorities, the opinions and dogmas of former centuries, the thick and dusty volumes which fill the shelves with the mystical and venerable wisdom of the old masters who governed intellectual humanity, must retire to the shades of antiquity. Instead of the laws of creed we produce the facts of experiment, which are mathematically exact; against the laws of custom and convenience we put the unalterable laws of nature; the dominating systems and dogmas of antiquity we set aside by the logic of absolute reason; in short, we neither accept, nor do we respect anything but what stands on its own feet, and can be demonstrated, openly and fully, anywhere.

In medical science Virchow was the first who introduced mathematical exactness into pathology; how little he was understood, and how his investigations were first received in Berlin, in 1857, can be learned by consulting the Preface to the second edition of his "Cellular Pathology," Vol. I. Nor am I aware that the cellular theory has, as yet, had any particular influence upon general practice. Niemeyer has tried somewhat to conform his teachings towards it, but

he could not completely strip off the form and the views of the old pathology. It can hardly be expected that a revolution in regard to the very foundation of comprehension, which must necessarily change the basis of everything, should readily become of general application. It requires at least one whole generation, an entire reconstruction of teachers and of modes of education, before such a result can be reached. If, by the publication of this volume, I have added anything toward clearness and absolutely defined comprehension, I have realized my purpose; and if it can be seen that medicine, as well as any other department of science, can be treated and fully demonstrated upon nothing but scientific experiment and reason, without any reliance whatever upon so called authoritative dogmas, I have reached all that I ever intended.

CONTENTS.

CONSUMPTION.

ALMOST every person who has listened to the statements or read the accounts of any two travellers who have passed over the same route, will have noticed that their views and opinions of the same things which attracted their attention, are sometimes so widely different as to present the appearance of contradiction, and perhaps call in question even, the veracity of both. But, when all the circumstances connected with the formation of the views of each are clearly understood, it may be seen that each, from his own stand-point of observation, has spoken of things as they *appeared* to him, and that instead of contradiction, the statements of the one constitute the *complement* of the other; or that the *facts* of each gave rise to trains of thought which led to different conclusions. Two persons may look at the same object, and yet, as the result of difference of tastes, or of culture, see two distinct and different things; this is true in politics, the arts, science, and in fact throughout the realm of thought. Take a diamond, for example. Its rarity, beauty, and brilliancy, call forth the admiration of one; its cutting and purity of color, the calculation of another, who has an eye only to its possible value; the peculiar processes of nature by which this pure crystallized carbon was produced, occupies the attention of a third; the various uses to which it is applied in the mechanical arts, come up for consideration by a fourth; while a fifth may be able to discover nothing but the unrequited toil, misery, and lacerated backs of the slaves who are compelled to labor under the scorching sun of the tropics, and the lash of the overseer, to obtain them, and so turns away in disgust. But a just appreciation of the value of the diamond, involves a knowledge not only of one class of facts connected with its history, uses, etc., but of all of them; — and so of every class of subjects which come up for investigation.

This is especially true relative to Consumption — a disease which probably presents more numerous difficulties, even to the greatest minds and most advanced thinkers of the age, than any other within the range of science. It will therefore be necessary to take a brief view of the various opinions which have been held at different periods, commencing with its earliest known history, 400 years before Christ.

Such a recurrence to the early history of this terrible scourge, will be found not only interesting and useful, as a means by which to trace to their original sources our own preconceived opinions, and those of others now prevalent relative to this subject, but of acquiring such knowledge in this connection as will lead to a clear understanding, and the formation of a correct judgment in reference to it.

From 460 to 377 before Christ, our old friend Hippocrates lived and flourished. His medical opinions relative to Consumption, governed the world without any material change until A.D. 1614, a period of 2,000 years. And even now, at this day, the same views are held by a large number of the medical profession, and to a considerable extent govern the public mind.

Hippocrates distinguished between *five* kinds of Consumption. The *first*,—what is now known under the name of *chronic pneumonia;* the *second* was caused by mucus dropping down from the head into the lungs; the *third*, by venous bleeding; the *fourth*, by a collection of blood, pus, and mucus, in the pleural cavity; and the *fifth*, and last, were abscesses of the lungs. From this, it would appear that Hippocrates had about as good a *general* knowledge of this subject as most men of the present day. Nor will the comparison suffer materially, if we consider the common-sense treatment which he employed for the different kinds of Consumption enumerated; in fact, from a common-sense stand-point, it will frequently be found to have been superior. His descriptions and distinctions are very much superior to those of the men who came after him, as we shall learn further on; and there are doubtless many flourishing practitioners, to-day, who have less real knowledge of Consumption, than was taught, by Hippocrates, more than 2,000 years ago. Whenever, during the past, anatomy has been encouraged and progress made in this direction, the knowledge of Consumption has advanced; but when anatomy has been discouraged and suppressed, and experience, speculations, sophisms, and mysticisms have taken its place, such knowledge could make no advancement, but, on the contrary, much of that, previously gained, was lost.

There existed at Alexandria, 320 years before Christ, a Medical School, the writings and teachings of which, however, have been mostly lost. We find a few remarks on this subject in the writings of Celsus, Ephesius, and Galenus. Celsus first used the word *tubercle*, but without attaching any particular meaning to it. From the above sources, scanty though they be, we find enough to convince us that the knowledge then possessed was most remarkable for the time. They had already discovered the existence of lymphatic vessels, which was afterwards lost, and only rediscovered nineteen centuries after, viz., in A.D. 1622. Claudius Galenus, a pupil of the Alexandria school, and a physician in Rome under the Emperors Marcus Aurelius and Commodus, A.D. 131–201, seems to have known less about Consumption than Hippocrates; but what we find in his writings, corresponds very nearly with what Hippocrates taught. He only speaks of ulcerated lungs;—and of sending his patients

to places where a *dry atmosphere* prevailed, for the purpose of drying up the ulcers. He also prescribed remedies adapted in his judgment to accomplish the same object. Hence physicians who recommend to their patients a change of climate, as from moist to dry, having in view the removal of any lung disease, are but following in the steps of Galenus of 1,700 years ago, and a practice which of itself is more than 2,000 years old; but such is the world. The history of one period repeats itself in another. The opinions and practice of one age or generation are discarded, only to be revived again as something new, after having been lost sight of, and forgotten, it may have been, for centuries. It should, however, be borne in mind that it does not follow, as some would seem to suppose, that a moist atmosphere is *productive* of tubercles, simply because that Galenus, and other medical practitioners, since his time have sent their consumptive patients to a dry atmosphere for cure. But it sometimes happens, through a misapprehension or misunderstanding of words and their origin, that from a common-sense idea, theories and practice of the very opposite character arise.

From Galenus, A.D. 131–201, down to the 16th century, a period of 1400 years, medical science made no progress whatever. During this period, practical anatomy was not only discouraged, but absolutely forbidden, on penalty of death. Galen's works were translated and retranslated, each succeeding translation being a little worse than the former, and all worse than the original. But in time, through men like Jacob Sylvius, 1500; Andreas Vesalius, born 1514; Gabriel Fallopia, 1523–1562; Eustachius (who died 1574); William Harvey, 1578–1657; and others following them, anatomy was not only revived, but developed and established as a science. On the revival and establishment of anatomical science, a new era dawned, and a fresh impetus was given to the development of medicine in general, and of the causes and cure of consumption in particular. Franciscus Deleboe Sylvius, 1614–1672, was the first author of this period who revised and advanced the ideas of Hippocrates and Galenus. He called the hard bunches which he found in the lungs of consumptives, tubercles; and distinguished between large and small ones. He is the first who speaks of the softening of these hard tubercles, thereby forming cavities and destroying the lungs. He also speaks of consumption of the blood, which he regarded as one kind of Consumption. The second kind he thought was originated by bad nutrition, causing tubercles. The third kind he demonstrated as degenerated glands, and through this theory he originated the idea of the relation between Scrophulosis and Consumption; a distinction which afterwards caused much confusion and many errors.

The views of Sylvius were followed, and very much enriched, by Willis, 1622–1675, Bonnet, 1620–1689, and Manget, 1700;—the result of *post-mortem* examinations made by them during these periods.

The views of Hippocrates, Galenus, and Sylvius, however, underwent no material change until Morton's famous book upon Consumption appeared in London, 1689. He developed views which were not

only superior to those of his own time, but which maintained their ascendancy for more than one hundred years. He says, Consumption is a wasting away of the whole body, having fever connected with it, and is caused by incorrect conditions of the lungs, with consequent ulcerations of them. The acid and diseased blood-water exudes into the soft tissues of the lung, obstructs it, causes inflammation, and final ulceration and decay. He distinguishes four different *stages* of this process. He also distinguishes Consumption from Catarrh, the former by a dry, and the latter by a moist cough; and defines an original (inherited) and an accidental (acquired) Consumption. He is the first to advance the theory, and positively to maintain the existence of *only one kind of Consumption*, which invariably originates from tubercles, or knots. By this theory he completely upset the old ulcer theory of former authors. This advance, however, was not accepted by his contemporaries, and consequently all further progress was not only arrested for more than one hundred years, but the advance, already gained, lost sight of, and forgotten, until revived and re-established by Bayle, in 1810.

From 1624–1689, Sydenham kept up the views of Hippocrates, as also did Frederick Hoffmann, 1660–1742, who, with slight variations, made ulceration the basis for Consumption. Boerhaave, 1668–1738, the most famous physician of his time, advocated the views of Galenus. Van Swieten, 1700–1772, was a follower of Boerhaave, whose pupil he was, and sought to make the ideas of Hippocrates, again, the prominent ones. Another pupil of Boerhaave, Auenbrugger, 1722–1809, made the discovery of *percussion of the chest;* a method by which, through thumping or tapping upon the chest, the more or less high and sonorous tones indicate a more or less density and degeneration of the lung-tissue. Although, through this discovery, which is now used by every intelligent physician, he made his name immortal, he added nothing new to the knowledge previously acquired on Consumption. Great physicians, like Sauvages, the immortal Morgagni, Stark, Reid, Cullen, Kortum, Baume, Hufeland, Portal, and others, made efforts to place medical science in relation to consumption in an advanced position, but with the exception of the discovery of Baillie, who demonstrated the existence of tubercles in other organs as well as in the lungs, no marked advance was made. Vetter, the anatomist, an independent thinker, and uninfluenced by the dominating opinions of the day, first distinguished between Phthisis of the lungs (inflammation and ulceration) and Tuberculosis, either inherited or acquired. And here it may be remarked, that after Morton established the theory that all Consumption originated through tubercles, in opposition to that of Hippocrates, of inflammation and ulceration, two distinct parties arose. The first considered that tubercles were originated by a *specific* something; the other admitted nothing of the kind, while Vetter, who, as we have already seen, had made some advance, accepted both; but Bayle (1774–1816) very soon gained such reputation as to overshadow him. Like Vetter, Bayle worked as an independent thinker, who would not be bound by the opinions of others, and the

result of his investigations gave to the world the tuberculous theory, in the further development and perfecting of which, the name of Lænnec became exceedingly famous. Bayle demonstrated Consumption as a general chronic disease, originated by a special principle (the tuberculous), and which had its seat principally in the glands, especially the lungs. He positively denied the doctrine of Hippocrates, that Consumption was caused by inflammation; but the greatest merit of Bayle consists in his discovery of what is now called miliary tuberculosis. Lænnec immediately followed Bayle, and succeeded in sweeping away all the previously existing theories for a period of fifty years, although his opponent Broussais fought hard for the old inflammation theory of Hippocrates, but without success. Lænnec not only explained all Consumptions, but Scrophulosis also, as nothing but the consequence of the tuberculous specific principle (specific new formation), which was inherited in most cases, but occasionally acquired. Lænnec supported his *theory* by *Auscultation*, a method which he himself discovered, by which, through the use of the ear, we are able to ascertain certain diseased conditions of the lungs with absolute certainty. He gave a most remarkable description of the gray and of the yellow tubercle, pointing out the peculiarities and characteristics which distinguish them; and to the doctrine of lung diseases he gave the very great importance which they at this day command;—in fact, until within a very short period he was regarded as having carried the pathology of Consumption to the highest degree of perfection.

Lænnec, though in such high repute as to command the views of physicians throughout the world, had very strong and remarkable opponents. His most dangerous adversary, after Broussais, was Andral, who demonstrated beyond a doubt the existence of an inflammatory Consumption, of the cheesy degeneration of thickened pus, which have now completely superseded the views of Lænnec. But they had hardly been brought under discussion, when Louis came to their rescue, and through his classical work entitled, "Recherches Anatomiques, Pathologique et Therapeutiques sur la Phthisie," re-established them, and he so completely commanded the opinions of physicians everywhere, that even names like Lallemand and Cruveilhier, who supported Andral, were not able to shake the specific tubercle theory sufficiently, to cause it to be given up by physicians in general.

A better and more general view was demonstrated by Schöenlein. He made a marked and positive distinction between Tuberculosis and Scrophulosis, both of which he tried to define anatomically. He added a great many valuable suggestions, but they were of little consequence to a majority of the physicians who at this time were blindly following the views of Lænnec. On the other hand, Rokitansky again demonstrated Tuberculosis and Scrophulosis as synonymous. Prominent among the authors of this period were Cannstadt, Vogel, Engel, Alison, Baron, Addison, Carswell, Clark, Stokes, Lebert, etc., all of whom made additions of more or less value to the knowledge previously acquired, which, however, was only pro-

ductive of the greatest confusion of opinion; so much so, that when a physician made use of a word, he had first to explain its meaning according to the author he used, in order to be understood. In the meantime the chemists Preuss, Simon, Lehmann, Scherer, Gavarret, and many others, made most exact analysis of sputa, blood, etc., but were not able to clear up the mystery. The more facts that became known, seemed only to add to the confusion of ideas and opinions. While at a previous period there were but two leading opinions, that of Hippocrates (inflammation and suppuration), and that of Morton and Lænnec (specific tubercle formation), we have during this period to distinguish between Phthisis, Scrophulosis, tuberculization of pus, tuberculous pus, gray infiltrations, yellow tubercle, gray tubercle, cheesy matter, primary and secondary affections, protein-exude, fibrous, croupous, albuminous tubercle, tubercle granules, granulosis, tubercle-corpuscles, etc., etc. The different kinds of Consumption were different with almost every author, and a greater confusion of facts with opinions can scarcely be imagined; and consequently the simple views of Lænnec were still held by a large number in preference to the extreme complications of others.

In 1850, Reinhardt succeeded in maintaining the position that Lænnec was wrong; and going back to the old opinion of Hippocrates, that tubercles were nothing but the result of inflammation, established the theory that all forms of Consumption were only a chronic pneumonia, with different appearances. The definitions of Virchow, who immortalized his name as the originator and author of cellular pathology, directly made their appearance. As before stated, anatomy was the only basis of absolute progress for science in this direction; but physicians at that and previous periods, for the most part knew little or nothing about it, because it was easier for them to accept the then established principles than to devote themselves to a hard, and, at times, an unthankful study, which sometimes had to be prosecuted under circumstances of very great difficulty; and hence they seldom, if at all, employed or turned to practical use the advances which had been made. They might speak of a discovery in the highest praise, but to turn it to practical use, were either unable or unwilling to take the trouble. Like many of more recent date, they doubtless considered themselves in possession of all necessary and sufficient knowledge so long as they retained what they had learned from others; though, for the most part, nothing but the thoughtless tools of opinions, of the value of which they were unable to judge. Hence the opinions of the oldest authors continued to be the leading ones in practice, notwithstanding the progress which had been made. The advances of anatomy, the meanwhile, became so marked, that something must needs be done, if nothing more than to change the outside coat of the thing. Anatomy had shown in the clearest manner, and by facts the most undeniable, that the old views were wrong; but instead of studying anatomy and making themselves masters of the situation, physicians went into speculations, and new ideas sprang up like mushrooms. There was no absurdity so great, or

nonsense so trifling, that it could not find a place in the books of famous physicians; and as each endeavored to defend his own absurdities and nonsense, there was nothing but war in connection with the various points at issue, thereby causing a state of confusion which gave to speculative charlatans, as well as to honest men, an excellent opportunity, which they did not fail to improve, for reaping a large harvest. Homœopathy, mesmerism, hypnotism, eclecticism, electricism, Rademacher's theory, and all sorts of wonder establishments, with their thousand and one specifics for each and every disease that flesh is heir to; with water-cures, mineral baths, air baths, etc., etc., each gathered to itself a share, and filled its garners with the spoils.

To distinguish those practitioners who declined, or were too independent in modes of thinking, to enroll their names as members of any particular school of medicine, Hahnemann, who contended that the principle upon which medicines were employed by these men, was to produce effects different from those resulting from disease, making use of two Greek words, which signify "other suffering," invented and applied to this so-called principle the term "allopathy," though it would have been difficult to find any two of them who held the same opinions.

Anatomy had made manifest the errors of the old systems, but had failed to substitute anything better, and, as a consequence, the very best physicians stood almost helpless, not knowing what to do with their patients; such was the chaos in connection with facts, opinions, and nonsense existing, when Virchow appeared upon the stage, bringing order out of confusion, sweeping out this Augean stable, and revolutionizing the whole practice of medicine. Gigantic and impossible as this work would seem to have been, it has nevertheless been so far accomplished as to influence and modify, to some extent, at least, the medical practice of the world, even where his name is not known or his authority acknowledged. In Germany, the era of medicine as a positive science has, as it were, but just commenced; while in France, England, and America, the foundations are scarcely laid, the discoveries of Virchow being comparatively unknown, and put to a practical use by none. But the old pathology (the science which has for its object the knowledge of disease) has been undermined, and is being superseded, slowly, but nevertheless surely, by the cellular pathology of Virchow. In fact, disease itself, as an entity, has vanished, and is now known only as a machine out of order. What at one time required an elaborate explanation in *words*, the meaning of which was very frequently not well understood by those who used them, is now *demonstrated* upon the blackboard with chalk or pencil. This was not possible previously to the discovery and application of the cellular principle, and is not even now practicable to a very great extent. And although Virchow has given a solid basis to medicine, rescued it from speculative charlatanism, and elevated it to the position and dignity of an absolute and positive science, he could not completely exhaust a single subject without losing himself too much in details; and as it

requires an exact and difficult study to bring the principles and laws which he has developed, into actual practice, considerable time will yet doubtless elapse before the fruits of his labors are everywhere openly acknowledged and appreciated. Further on, the pathology of Consumption, as demonstrated by Virchow, with such additional discoveries as have been made by the writer, will be given.

In passing, we cannot omit to mention the name of Niemeyer, who has not only made many valuable additions relative to that kind of Consumption known as Chronic Pneumonia, and which comprises more than one-half of consumptive cases, but to whom also belongs the honor of having done very much to bring into practical application and use the discoveries of Virchow.

Notwithstanding that the old theories have been completely exploded by Virchow, there are men yet to be found who make every effort to sustain the views of Lænnec; more especially is this the case in France. But as they cannot directly contradict Virchow, they help themselves by creating a new name for an old thing, invent the term "granulosis," and make it appear as the name of an entirely new species. It is hardly necessary to remark that such speculations are of no consequence whatever to science. The days for the old trick of inventing new words for old and forgotten theories, thanks to anatomy, have forever passed away. But as prominent among the names of those who have taken this position, we may mention that of Lorain, Robin, and Empis (a new writer). Villemin, the experimenter, by a series of experimental inoculations, imagined that he had discovered something new. His experiments, which were subsequently repeated in England, and more especially in Germany (by Waldenburg, in Berlin), though at first sight seeming to establish the views of Lænnec, when fully understood, only go to prove the correctness of what we have to advance on this subject. Undeniable facts, with incorrect conclusions drawn from them, have been the occasion of great confusion at all times, and in all directions.

HISTORY. — TREATMENT.

HAVING given, in brief, the historic and general view of Consumption, we pause to take note of the varied treatment employed for its amelioration and cure. If we have found that during the past, great confusion of ideas relative to the origin, nature, and character of consumption have existed, it will not be surprising if we find a similar confusion in reference to its treatment, which necessarily changed with every change of view relative to the disease. The treatment of Hippocrates, Galen, and all the old physicians, was similar to that of ulcers in other parts of the body. They sought to dry up these ulcers by means of inhalations of different things, such as tar, myrrh, etc.; to delay the cough by the use of narcotic herbs; and at last, by sending their patients to dry places. They were also acquainted with the use of surgical instruments in certain forms of pleurisy, etc., from all of which we draw the inference, that patients under their treatment fared, to say the least, no worse than those of the present day.

The old Greek and Roman physicians, for the most part, used vegetable compounds as internal remedies; though occasionally they employed minerals, (gold, antimony, and arsenic, the use of which was learned from the Arabian physicians,) to some of which they ascribed the most wonderful properties; but, in general, minerals were only employed as charms. The treatment and remedies of Galen covered a period of about 1500 years, or nearly to the present century. Every writer upon therapeutics during this period, it is true, had made an attempt to add something to it, but by far the greater part was what Galen himself had written.

During the mystical period, the monks were the principal possessors of knowledge, and an ordinary physician probably knew less than a good modern nurse. The monks, however, were in possession of secret remedies, and proprietors of the philosopher's stone, etc., of their times. About A.D. 1520, Paracelsus appeared upon the stage of medical history, and was successful in demolishing many of the old ideas and doctrines, and of introducing opium in combination with minerals — especially antimony and mercury — into practice. His success in the healing art, which was mostly performed in the open market-place, roused the jealousy of his contemporaries to a high degree, who pronounced him a quack and an impostor, though very soon imitating whatever they could learn from him.

In connection with the ulcer theory, antimony, lead, and opium kept the field; not, however, to the entire exclusion of vegetable preparations. Lung-wort (Pulmonaria Officinalis), Hoarhound (Marrubium Vulgare), Yarrow (Achillea Millefolium), and many other herbs of similar character, as also those which possessed narcotic properties, among which were the following: — Cowbane (Cicuta Virosa), Poison Hemlock (Conium Maculatum),

Lactucarium (Lactura Virosa), Fox-glove (Digitalis Purpurea), Stramonium (Datura Stramonium), Deadly Night-shade (Atropa Belladonna), Henbane (Hyoscyamus Niger), etc., with a great variety of roots, mosses, and barks, being used to a considerable extent. The executioners of those times were also very famous on account of the secret remedies they were supposed to possess, some of which were arsenic, antimony, the blood of persons who had been executed, etc. At one time, the white excrement of dogs, containing lime, was a remarkable and most famous remedy, among high and low, rich and poor; and even within a few years, the writer has seen peasants use it. The fat of dogs, cats (especially wild ones), foxes, and of other animals, has had many advocates and admirers. Snake oil, spiders, snails, and different kinds of bugs, have been freely used, but for most part without the knowledge of the patient; the remedies being given on or between pieces of bread. External manipulations have also been more or less prominent among the remedies employed. Plasters, setons, and ointments, were in vogue. Artificial ulcers were made upon the arm to relieve the lungs. Mineral springs were resorted to during all the past, as at the present time. It is, however, next to impossible to define which or what remedies were mostly or more especially employed at any one period, the practice being not altogether unlike that of the present. Particular remedies became fashionable in certain locations, from the fact that some particular crowned head, prince, or renowned character, had used it, or because it was believed that some particular personage had derived benefit from it. It was in this way that Peruvian Bark gained a great reputation in consumption. Louis XIV. bought it as a secret remedy, for which he paid 2,000 Louis d'or (about $9,680), and therefore it must be good. As long as the ulcer theory continued to predominate, it was known that consumption (the ulcers) would heal under certain circumstances, and whenever this occurred under the employment of any given remedy, this, of course, was the one.

During a more recent period, when the *specific principle* theory of Consumption was in the ascendant, it was natural that a *specific remedy* should be sought for. At one time mercury was everywhere the most prominent remedy, it being thought that it possessed the power of destroying the *specific principle*, but in the end was found to be bad. Another of the specific remedies, was what was known as the "emetic cure." It was thought that the specific principle of the disease (noxa) could in some way be induced to leave the lungs and be ejected through the operation of the emetic. Antimony, arsenic, lead, gold, silver, and other minerals, especially iron (when it became known that this metal formed a constituent of the body), have played a conspicuous part in the specific cure treatment. At one time, prussic acid gained a high reputation as a specific, though opium maintained the first position, either by itself or in connection with sugar of lead. New remedies were in constant demand to satisfy the failing patient, who, like a drowning man, was ready to catch at anything. Sulphur and sulphur baths were recommended

by one; creosote, or gums and resins, by another; and chloride of ammonium, with sea bathing, or sea-salt bath, etc., by another, and so on, *ad infinitum*. The great Hahnemannian *specific* remedy is the *pus* of animals suffering from horse glanders (Rotz-gift), in very high dilutions. Others recommended the poison of bees, and of venomous snakes, as the better antidote. In connection with a very strong faith and a lively imagination, it is not improbable that some of these remedies may have proved useful to the patient. The effectiveness of this class of specifics, however, would doubtless have been better appreciated, had they for a basis something better to rest upon than such very highly diluted infinitesimal quantities of anatomy, physiology, physics, chemistry, and pathology, that it would be impossible to detect them.

After the discovery of iodine it was thought that no remedy could be made to supercede it; but, like all previous specifics, it failed to meet the expectations of its advocates. In the meantime the views of Lænnec became predominant, and the conviction more or less established, that the disease was absolutely incurable. This view, however, was very strongly opposed by Broussais, who, by bleeding, thought he could extract the diseased blood, and, by creating new, save the patient; but his failures in practice only served to fortify the views of his opponents.

As the result of these opposing views relative to the curability of Consumption, greater attention was paid to the present comfort of the patient, by seeking to relieve the more urgent symptoms, and, when practicable, by sending them to different places for change of air, diet, scenery, etc., in accordance with the wishes or caprice of the patient, or the prevalent practice of the time. At one time, it was the sea, at another, Italy, then Egypt, and then to Greenland, because Consumption was not found there; then, again, to the south of France. They were also sent to coal mines, because the workmen were very seldom troubled with Consumption; and one man started the idea that living in stables was beneficial, because persons employed in them were free from this disease. Stables having extra accommodation, were therefore built for this purpose, but continued to be used only for a very short period.

The discovery of iodine in cod-liver oil by a chemist, led to its very general use some thirty years since in Germany. It was introduced into England by Bennet, and highly recommended by Williams, of London; and very soon became almost universally used as a remedy in this country. Its high reputation was not altogether due to imagination, as may be seen from the following. The poorer classes of Europe very seldom, if ever, ate the flesh or fat of animals, being unable to procure them. Their principal diet was composed of potatoes and rape-oil; an unwholesome vegetable oil, used principally for burning purposes. When such half-starved persons went to the dispensaries, and were treated with cod-liver oil, it was found that they immediately began to improve, and to gain in flesh and weight; and hence the prevalent idea of its curative qualities and extensive employment; but good beefsteak, with

plenty of bread and good butter, would have produced similar, if not better results.

The demonstrations of Liebig relative to life—that it was a burning process through oxygen, and in reference to which Henle jokingly remarked, "if so, then we should be able to sustain latent life in the body by the exclusion of oxygen, as in grain by the exclusion of moisture"—led to the extensive use of fusel oil, which obtained a great reputation in England and in this country. A speculative Englishman, from the demonstrations of Liebig and the hint contained in the playful remark of Henle, concluded that if some remedy were employed which contained no oxygen, the wasting or burning away of consumptive lungs might be arrested; and as fusel oil contained very little oxygen, the formula of which as used is $C^{10} H^{10} + 2 H O$, he experimented with it, and published a pamphlet on the subject. In this way fusel oil came into use, and was largely prescribed for consumptives, very much to the disadvantage, however, of the digestion of the victims. Fusel oil may be recognized as one of the ingredients of vile liquors which makes people sick when they drink them.

In this connection we may here mention the use of alcohol as a remedy; it being still recommended by many physicians at home and abroad. It is one of the remnants of Brown's theories of diseases (based upon Galen), and of their treatment,—that want of force should be treated by stimulants. On this subject Dr. Anstie, of London, has the following: "The question of alcohol in phthisis of adults is hotly disputed; on the one hand, many authorities maintain that it is an unmixed evil; on the other hand, the treatment possesses numerous advocates, and we even meet with records (by Flint and others) of patients almost exclusively nourished upon an alcoholic diet for prolonged periods, with apparently beneficial effect." "This subject has engaged our particular attention, and without expressing a very confident opinion, we have good grounds for believing that the following is a near approach to the truth." "There are two classes of cases in which alcohol appears to play an important part in the arrest of phthisis." "In a class of patients who have delicate skins and perspire very freely, and with whom, at the same time, oil and fatty matters habitually disagree (a not very common combination of conditions, but one which is seen in a certain number of instances), we have more than once seen remarkable effects produced by the entire abandonment of all medication and the employment of large doses of spirit—whiskey or rum; and a singular point in these cases was the *tolerance* of alcohol that was shown, even from the first." . . . . "Our own experience has led us to believe that the question must be judged just as we have proposed that it should be judged in cases of acute disease,—*experimentally*." "In each case the effects of experimental doses upon the form of the pulse-wave, and on the temperature, and the elimination of alcohol by the kidneys, should be carefully tested; and according to what we have noted, in observing a large number of cases, we are justified in believing that when alcohol reduces temperature, and

the dicrotions of the pulse, and fails to pass away in notable quantity by the kidney, it *always does good;* but that the slightest degree of narcotic action of alcohol is harmful."

Our own opinion, however, of the action of alcohol in Pulmonary Consumption, and in cases that are mistaken as such, is: that nothing brings the patient more quickly and surely to the grave, especially if taken during the period of tuberculous formations; — that by its fat accumulations it excludes minerals from the blood which are really the only hope of cure, and makes the death of the patient one of restless torture, when by other treatment he might have recovered; or, if otherwise, come to his death like a person falling asleep, without struggling and tortuous suffocation.

We conceive that alcohol helps a consumptive person much in the same way as it helps a man failing in business, mind, or capacity. That it makes the patient *feel* better, in the meantime, while under the influence of the alcohol, we will not deny; but his feeling better and being better are two very distinct things.

The old Greek treatment of inhalations was revived again in Germany about twenty-five years ago. At first, chloride of ammonium was used; afterwards, narcotics were employed, from which the smoking of stramonium cigars had its origin. It was not long before other vapors were employed, and this treatment, in different variations, came to be employed by many physicians. To inhale finely dispersed liquids, holding medicine in solution, is one of the latest modifications of this treatment. There can be no doubt that many suffering from chronic bronchitis have been benefited and temporarily relieved by this method of treatment; and more especially is this the case in asthmatic affections, its effects being often immediate.

What was known as the cold water treatment of consumptives has also been somewhat extensively employed, but always with serious injury to the patient. To visit these cold water institutions and witness the chattering of teeth, the blue lips and nails of the poor fellows under treatment, was enough to call forth the pity and commiseration of a stone. The grape-cure has been employed with great benefit to many sufferers, by rectifying their digestion, and, with this object in view, is still recommended by the best physicians in Europe. But the milk-cure has proved even more beneficial, especially to the wealthy, whose means have permitted them to visit Switzerland, the Pyrenees, Sicily, or Peru, and to enjoy the best milk in connection with the pure mountain air. That most consumptives will feel better under these changed conditions of air, scenery, etc., than at home, shut up in a sick-room, especially for the first few months, it is not at all difficult to comprehend; while there are many cases of chronic bronchitis and catarrh which are in this way really cured.

The extract of malt, of meat, and the juice of various herbs, alone or in combination with other remedies, have been most thoroughly employed, with at least no disadvantage to most patients. The decoctions of mosses containing gelatine have also been em-

ployed in all periods. In Germany, it has been highly recommended that consumptives live in pine woods, that they may inhale the balsamic odor emitted by the trees. But the greatest expectations were raised, based upon increased and decreased atmospheric pressure, by means of bells and an air-pump. Patients were put under a glass bell, and the atmospheric pressure increased, with a view to promote the healing of the lungs. Again, the patient was secured in a bell up to the neck, and the atmospheric pressure withdrawn, by pumping out the air, and by thus causing a congestion of the skin, it was thought to draw the inflammation from the lungs; but both these manipulations proved to be injurious, in a very high degree, to consumptives.

Phosphorus, in various forms, has, of late, been freely used, it being thought that phosphorus formed one of the predominant elements of animal life; but the results obtained have fared no better than those of other specifics. The best and most thoroughly educated physicians of the present, do not employ specific medicines. They endeavor to sustain their patients by appropriate nourishment, and to relieve as much as possible from the annoyance and discomfort arising from particular symptoms. For excessive coughing, expectorants, soothing balsams, antimonial preparations, narcotics, etc., are employed. Sleeplessness is overcome by morphine and other hypnotics; night-sweats by mineral acids and quinine, or other tonics; sore throat by inhalations, cauterizations, etc., etc. Consumptive patients are also sent to milder climates to spend the winter months: in Europe, they are sent to Africa or Madeira; in America, to Florida, Mexico, Chili, Peru, California, and other places, and occasionally to curative institutions which have been established in Germany, Sweden, and France. It has been proved by experience in England, that the establishment of hospitals for consumptives is not advisable.

In reference to the effect of climate: the influence of the soil, whether composed chiefly of sand, clay, loam, or an alluvial deposit, damp or dry, and in connection with its cultivation; of the atmosphere, rare, dense, moist, saline, or otherwise; of temperature, mild and even or extreme and variable; of occupation, in or out door, mental or physical, sedentary or active; of the sea; of lakes; of rivers; of swamps; of winds; of electrical currents; of increased and decreased pressure, etc., the most thorough and searching investigations have been made, and statistics obtained with a view of ascertaining the cause and cure of Consumption. And in this connection we may here state, that probably no man living has made his name more widely known, or labored more earnestly and indefatigably in this direction, than Prof. Dr. Richter, Dresden.

Sea air was regarded by Lænnec as an antidote or preventive, while on the other hand Rochard proved, by statistics, that the mortality from Consumption was greater among the marine than among the land troops. Winteritz, however, was able to show that sailors were comparatively free from it. Bochardat arrived at the following conclusions: That persons suffering from diabetes always exhibit

tuberculosis; that cows kept upon food containing sugar, and deprived of free exercise in the open air, die of it; that monkeys, and even negroes die of it, when carried north; that indolence was one of its causes, which he endeavored to prove by citing cases of creoles and of nuns, who were accustomed to work hard, as outliving the indolent and inactive. He also cited in proof of his position cases of prisoners who were deprived of their usual exercise. He concluded from these facts, that lack of warmth was a productive cause of the disease. The fact, however, that this disease is unknown to the Esquimaux and inhabitants of the Hudson Bay, militates against this conclusion. It was ascertained by R. Foerster that children never exhibit tuberculosis under five years of age, with an occasional exception at the age of two, and not usually before the age of puberty. From statistics it has been shown by Lewin that the mortality among stone-masons, cotton-workers, porcelain-workers, and all such as are habitually exposed to dust, is greater from pneumonia and bronchitis than from tuberculosis. Pritchard, who lived about twenty years on the South Sea Islands, writes as follows: "Nothing kills the Indians so surely as coats, pants, and blankets; the pantaloon-wearing South Sea Islander catches cold and dies of consumption, a disease previously unknown to them." In 1860, a settlement was founded by the English on Vancouver's Island, which then belonged to a class of Indians who lived upon fish, wild berries, and roots, with an occasional change of wild game, and whose health had always been good. The English gave these Indians, in exchange for their land, flour, rice, syrup, potatoes, meat, blankets, clothing, and other luxuries. As the result of these changes in their modes of life, they very soon began to sicken, and two years later were destroyed in large numbers by tubercular consumption. In 1865, prisoners were taken by the English, in the Gulf of Bengal, transported to the opposite coast, and treated with the utmost kindness. They were provided with luxuries previously unknown to them, but very soon gave unmistakable signs of tuberculosis, of which large numbers of them perished, and the survivors saved from a similar fate only by being sent back again.

It is generally known that sewing-girls, shoemakers, clerks, etc., who are very much confined in their occupations, are among the surest victims of Consumption; and that athletes, ballet-dancers, gymnasts, and persons similarly engaged, die of this disease often after they relinquish their business. In mountainous regions, tubercular Consumption is almost unknown; but bronchitis and pneumonia take its place. Within the last fifty years, the significant fact has been noticed by physicians, that a disease of the right heart, which prevents the free flow of the blood to the lungs, is most generally complicated with tuberculosis, while the same disorder in the left heart absolutely excludes it. In other words, the comparatively small quantity of blood in the lungs in the first instance favors tuberculosis, while the comparative fulness of the lungs in the second instance positively prevents it. Another very peculiar fact that has been observed is, that tuberculosis is developed only in the upper points of the lungs, and never at the base of the lobes;

while all other affections most generally make their appearance at the base of the lobes, or where the lungs are mostly used, the upper points being comparatively free from attack in such cases. While these facts have been observed and noted, no one has been able to give a satisfactory reason for them.

As to the contagiousness of Consumption, opinions have varied very much: practitioners, in general, taking the affirmative side of the question. A few years since, Dr. Budd, of Bristol, England, in the London *Lancet*, advanced the idea that the contagion probably consisted of minute germs (spores), originating from the sputa expectorated by consumptives, which, floating in the atmosphere, were inhaled by others, and became productive of the disease. This germ theory of disease has had many advocates, and only very recently Prof. Tyndall made a series of experiments in this direction, an account of which was published; but the *conclusions* arrived at were not of a character to add much to the reputation he had previously gained. The fact is, that, in a great many cases, the observations which have been made, in connection with statistics, not only make the theory of contagiousness plausible, but seem to prove it; as to certainty, however, no evidence exists.

As previously stated, physicians at different periods avoided the study and practical use of anatomy, and, therefore, during the centuries that anatomy, as a science, had no existence, disease was regarded as an entity; a positive something inherited, or which walked about, travelled, or hid itself in clothing, etc., or leaped from one person to another; and hence the search for remedies against an enemy which appeared in different forms with different symptoms. As anatomy became developed, the name and form of this enemy was changed. At a very early period it was the devil, then it was contagion, miasma, inheritance, invisible spores, disease-germs, etc., etc.; but these having been swept away, the enemy (noxa) is now sought for in climate, air, etc. The triennial report of Prof. Dr. Richter, of Dresden, (one of the chief editors of Schmidt's *Jahrbuccher*, one of the first medical journals of Europe,) contains the most minute details of geographical, geological, climatological, atmospherical, etc., etc., statistics and reports, especially in reference to Consumption. But interesting as this report is in regard to general information, it is painful to observe its vagueness in reference to the miasmatical origin of disease, especially of Consumption. As an illustration of the truth of this statement, we quote the following: (See Schmidt's *Jahrbuccher*, 1870, No. 10, page 96.) "The discussion of Dr. Leopold Mueller and Prof. Hirsch, in the Berlin (Prussia) Medical Society, on the causes of the appearance of malarial fevers in dry and dampless localities, and their non-appearance in swampy regions, is very interesting." "In regard to the first, L. Mueller gives as cause — 1. The artificial irrigations, and, 2. Conduction of miasma by winds; for example, near Cape Haitien, in Haiti, the predominating north-east winds in the dry season conduct the fevers into the country seats, and compel the inhabitants to move into the city, where they had previously been

exposed to the same miasma by south and south-east winds." Having spent six months at the place referred to in the above extract, and being well acquainted with all the circumstances, as also with Dr. Mueller (who, if we mistake not, was chief surgeon to Geffrard, at the siege of Cape Haitien, 1865), we are able to give the *true key* to this dreadful miasma. The city of Cape Haitien, like all large cities, is situated near a river, with marshy banks at its mouth, but is separated from the swamps by the slope of a range of high mountains, the edge of which is called "le Haut du Cap"; a delightful spot, from which a beautiful view is obtained of the valley called "la Plaine du Nord." An especially dry season, such as is common in other places in Haiti, *e.g.*, Gonaives, is unknown at the Cap; while the average health of the city will not compare very unfavorably with that of cities in other parts of the world. There are fevers there, it is true, the same as in other parts of the tropics, *and at all times and with all winds*, except in the direct vicinity of these swamps,—the plains, where an extraordinary degree of health exists.

The facts in the case are as follows: In 1865, Dr. Mueller was there with an army of six thousand men, half of which were stationed on the Haut du Cap, and the other half on the opposite side of the river, and directly opposite to the city. The road from Port au Prince leads over the Haut du Cap, and the provisions for the army had to pass over this road, the harbor being closed by the insurrectionists. During times of peace, the food of these soldiers consisted principally of rice, bananas, and a little salt fish, while now, it consisted principally of salt pork; bananas being too expensive, and not easily transported. No sooner has a Haitien changed his diet, as just described, than he gets "la fievre," no matter where he is. By eating ham and eggs myself, a fever chill could be produced in two hours by the watch; the effect of pork upon the Haitien soldier who was not accustomed to its use, but so fond of it as to fill himself to satiety, can therefore be very easily imagined. The miasma which the wind blew up there in 1865, and caused the fever, did not originate in the swamps, but was sent from Boston in pork barrels, containing a very inferior quality of swines' flesh. Such is the foundation upon which the discussion and statistics of Dr. Mueller rest in the case before us, and hence their vagueness and unsatisfactory character may be easily accounted for. It is true that impure air from the decomposition of organic matter is bad, but so is common gas, and, even more so, the carbonic acid which we exhale, but it does not follow that they constitute a miasma, which floats about in the air.

This seeming digression from our subject has been made on account of the claims set forth by the parties in question; but as we are unable to understand how, or in what way, reports like the one from which we have copied go to show the miasmatical origin of consumption, we leave it with our readers to determine. In relation to the inheritability of consumption, physicians in general affirm that, in their opinion, it is inherited in most cases; though men like Louis, Bochardat, Niemeyer, Virchow, and many others, have denied it, while

they admit the inheritability of a *tendency* only; but on this point nothing has been established, it being simply a matter of opinion and of varying observations.

The curability of consumption, under certain circumstances, was never doubted by the old authors; and only since the establishment of the *tuberculous specific principle theory* has a cure been considered impossible. Those physicians who accepted the theory of the inflammatory nature of consumption considered it curable, the others as incurable. The first class is represented by Hippocrates, Galen, with their followers, Meckel, Alison, Carswell, Broussais, Schoenlein, Virchow, Niemeyer, Bennett, and many others. The other class is represented principally by Morton, Bayle, Lænnec, and Louis (absolutely), Cannstadt, Clark, and Lebert, with their followers.

The physicians of Germany, and the greater part of the physicians of France, now *know* that consumption is sometimes curable by nature, while, on the other hand, there are few in England, with the exception of Bennett, and those who are influenced by him, who consider it curable under any circumstances whatever; a view which is all but universal in this country.

In concluding this sketch of the history of consumption, we take the liberty of presenting an extract from the preface of a treatise on consumption by Prof. I. H. Bennett, of Edinburgh:

"For five years the author held the position of pathologist to the Royal Infirmary of Edinburgh, during which period he performed and recorded the results of upwards of two thousand post-mortem examinations." "Gradually one great fact became impressed upon his mind, viz.: that all organic diseases occasionally presented a tendency to spontaneous cure." "He was repeatedly meeting with instances where, although death was occasioned by disease in one organ, there were others which presented traces of previously existing lesions, which in some way had healed." "In no organs were such appearances more common than in the lungs, *and of no disease was evidence of a spontaneous cure more frequent than of pulmonary phthisis.*"

"Although it was generally considered by the profession that no remedy and no plan of treatment yet proposed could be depended on in cases of consumption, *it was obvious to the author, that if the process employed by nature could be discovered, and then imitated by art, we might ultimately arrive at the true principle of cure.*"

The Nature and Application of the Cellular Principle.

ALL the various forms of matter which exist have certain qualities, which may be divided into active and passive; oxygen being the most active, and carbon the most passive of them all. Oxygen, therefore, has the strongest affinity for carbon, and its combinations are the most intimate and difficult of decomposition *of any yet known*. Certain forms of matter of a generally passive character, under favorable circumstances, possess the quality essential to the formation of crystals. And it is a remarkable fact, that each matter, or even combination, has always and invariably the same crystal form peculiar to itself. The constant tendency of the active to pursue the passive, for combination with them, constitutes what, from a scientific point of view, is called life, — a tendency to which may be found in all, and every kind of matter. The various combinations which are taking place, and the compound substances that are in constant process of formation, have their origin in this principle. By the aid of science these combinations are analyzed, and the compound substances are thus decomposed into what is called elements, or elementary matter. Thus, by the light which science reveals, we gain some definite knowledge of the various properties and qualities of the different forms of matter, their relations to each other, and the results arising from their combination. As oxygen is the most active of all known substances, it is always ready, upon every occasion which offers, to act upon every other element, or combination of elements, with which it comes in contact. The opportunity for its doing so may exist in pressure, concussive motion, light, electricity, heat, or by a third element, or by a combination of elements. Any two elements may combine under given cicumstances, one being always more active than the other. When another element, more active than either of the previous, is brought into exercise, it may destroy their unity by decomposing them, and appropriate the more passive to itself, or it may combine with both together.

Life may be either organic or inorganic in its nature; but the difference between them is, perhaps, not as great as is generally supposed. The latter may be regarded as simple, the former as complicated life. The simple or inorganic forms of life are found to exist before the commencement of the organic, or complicated; and also, again, after it has ceased to exist. Organic, or complicated life, therefore, may be regarded as occupying a position midway between the two periods of simple or inorganic life. Illustrations of inorganic life may be found in the growth of stones, the formation of crystals and precious gems, and of electrical currents. Similar illustrations of organic life are more readily seen in the under-ferment cell, in the infinite variety of the vegetable and animal kingdom, and in the human organism; the first-named being

the lowest form of organic life known, and the latter the highest. Inorganic life can exist independent of the organic, but the organic cannot exist without the inorganic; organic life is, therefore, a complication of inorganic life qualities; the first is limited, the other is not.

How very nearly inorganic and organic life are related, might be shown by a diagram, and also by experiments. The fundamental elements of organic life are carbon, nitrogen, oxygen, and hydrogen; next in order, sulphur, phosphorus, and chlor; then potassium and sodium: and last, light and ozon, etc., all of which are linked together by galvano-electricity. Potassium and sodium can, however, be represented by other minerals.

When certain mixtures of these elements come into contact under favorable conditions, an organism can constitute itself. For example: if we take honey, or fruit-juice, or starch, and mix it with albumen in water, expose it to from 70 to 90 degrees Fahrenheit, and to atmospheric air, and influence without disturbance, we shall find that after a given time it will contain certain elementary molecules, which will afterwards form themselves into under-ferment cells. Nor do we regard it as impossible, that the parasites found in the smegma of the dermal tallow-glands (*acarus folliculorum*) are a species of animal *generatio æquivoca*.

We are aware that the opinions generally held are in opposition to the one here expressed. It is maintained that the spores from which the cells form themselves were invariably flying in the air, and that consequently no *generatio æquivoca* exists. That spores do thus float in the air, and that ferment cells are usually produced in that way, we very well know; but the denial of the possibility of cell formation from inorganic substances rests upon opinion, and experiments which are by no means conclusive. The experiments which have been made with glowed or heated oxygen are of little or no value, since it has been proven that oxygen is materially influenced by such manipulation. The arguments for and against the *generatio æquivoca* are about equal; and a principal reason why we maintain its possibility is, that the denial at once excludes investigation upon a subject which has by no means been sufficiently or satisfactorily investigated. If we cannot now change an under-ferment cell into an upper-ferment cell, that is no reason why the possibility of such change should be denied; or if we cannot, at the present time, arrest the development of cancer-cells, it is no proof that the thing is impossible. If everybody had considered the specific new formation of tubercle cells a settled fact, the artificial calcification of diseased cells could never have been discovered.*

We have said that each matter, or element, has its own peculiarity; every element has a weight of its own, which is known by numbers. Hydrogen, being the lightest, has the number 1; oxygen, 8; carbon, 6; Nitrogen, 14, etc. If one element combines

*The respective contributions on this subject, by Prof. H. Charlton Bastian and Dr. Hilgard, substantially supporting the above views, were not published at the time this paper was written.

with another under certain conditions, then this combination will always take place under the same proportions of weight (equivalents). For example, oxygen combines with hydrogen to form water. We always have 8 equivalents of oxygen to 1 equivalent of hydrogen; it is impossible that 4, or 5, or 7, or 9 of oxygen could be combined with 1 of hydrogen. This number eight is peculiar to oxygen only, and cannot be found with any other element, or combination of elements; it is the invariable quality of oxygen, and characterizes it in all combinations. Carbonic acid consists of 1 carbon, which has 6 for its number, with 2 oxygen, with 8 for its number; its formula is $C O^2$, consequently its combination in equivalents is 6 carbon to 16 oxygen. It is impossible to have 6 carbon to 15 or 17 oxygen, or 4 or 5 carbon to 16 oxygen. This unvarying, most exact, and absolute adherence to her own formula by nature, in all her realms, is here stated to show the mathematical precision with which she carries on her work.

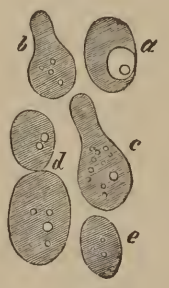
The different elements, as before stated, can combine among themselves in all directions, but they must always and immutably follow another unchanging law. For as all combinations must always and invariably take place with certain and unchanging equivalents, according to the law just stated, so, when from any cause a body becomes decomposed, the elements which constituted it being thus set free, must from necessity *form* their new unities, in accordance with such organism as may happen to be in process of construction at the place where, and that instant of time when, such particular element was set free. This constitutes our second law. For example: if we take a grain of wheat, and decompose it in our stomach, its elements are bound to serve as material for animal cells; if we take it and throw it into a fermenting liquid, its elements are then bound to serve for the formation of ferment cells. If we take cells from our own body, and place them within reach of an apple-tree, the elements of our cells are bound to serve for the purposes of the apple-tree. It is in accordance with this law that plants are nourished by the gases of the atmosphere, and by fertilizers applied to the soil; and it is also in accordance with this law that our bodies are nourished and sustained by the various forms of food of which we partake. In fact upon this law rests the arrangement of the whole world.

Now if our readers will keep in mind these two primary laws relative to organic life in connection with the principles previously presented, they will be better able to understand what we have to say of the living cell.

But what is a cell? A cell is a bubble, or a minute enclosed space or sac, containing liquid and solid material, and is protected outside by a very fine and delicate membrane. "Cells," says a German author, "are the stones (or building material) with which plants and animals are built, and as all these several parts carry on a life of their own, they consequently make the whole building a living one." Everything that shows organic life is composed of one or more cells. The lowest form of organism known is the under-ferment cell, being

in itself but a single cell, while in the highest, the human organism, the number is almost infinite. The under-ferment cell propagates itself by minute spores, which originate in the mother-cell, and, in process of time, penetrate its wall, and begin to support themselves, independent of the parent. There are, however, only a few of the lowest fungi which propagate themselves in this way by spores. The upper-ferment cell propagates itself by forming a bud out of its own wall, and by a gradual stringing off of this bud,

Fig. 1.



a. An upper-ferment cell, with nucleus and nucleolus.
b. The same cell beginning to bud.
c. The same more advanced.
d. The young cell ready to string off.
e. The young cell free.

as shown in *Fig.* 1. All vegetable and animal cells are propagated in this manner. But in all cases the mother-cell remains, with full power to form new cells. The cell receives the proper nourishment for its life and growth by means of its outside membrane. A constant exchange, called endosmose and exosmose, takes place between the contents in the cell and the liquid outside of it, in such a way that the weaker liquid always moves towards the stronger, or more concentrated one, in accordance with the second law already named. (Law No. II.)

If we take a bladder filled with albumen, and put it into water, we shall very soon observe that the contents in the bladder have increased; on the other hand, if we take a bladder filled with water and put it into albumen, the bladder will soon be emptied of its contents. All our investigations rest upon principles which are involved in this fact, and a knowledge of which gives us the power to control cellular life, or, in larger scope, it gives us the power to enslave life and nature herself. Thus we force the earth to be fertile, and animals to improve; and thus we can govern and manage our own bodies.

The importance of the discovery of steam-power and of galvano-electricity, may serve, in a measure, as an illustration of the very great importance of the discovery and demonstration of the cellular principle. For as by the two former the most radical changes in the various marts of life have been effected, — continents spanned, remote nations brought into communication and contact, — time and distance practically annihilated, and all our processes of manufac-

ture, transportation, and communication modified; so, as the result of the latter, the old theories of medical science and practice are destined to undergo a similar revision and change.

The origination of the theory of this principle we owe to Schleiden the botanist. Schwann, however, was the first who attempted to show the similarity of construction between the animal and vegetable cell.

But the cellular principle, as the basis of all medical science, and of life, was first demonstrated by Virchow, and first introduced into America in 1857, by the writer.

The most remarkable difference which exists between vegetable and animal cells, excepting those which propagate by spores (fungi), consists in their specific form and office; and in the fact that the vegetable cells absorb carbonic acid and exhale oxygen, while on the other hand the animal cells absorb oxygen and exhale carbon. Cells also differ materially in their sensibility as to life; the lower the cell, the more tenacious its life; the higher the cell, the more sensitive it becomes.

Vegetable cells have here, for our purpose, value only as comparative elements from which our animal cellular principle originated. In the rough structure all cells consist of a covering and a liquid inside, which, in vegetable cells, can dry up without loss of life-principle. Most cells contain another body inside, and sometimes several. This is called the nucleus. Inside of this nucleus we observe again another still smaller body, which is called the nucleolus. (See *Fig.* 1, *a.*) If a cell grows for propagation, it has first to form two or more nuclei, and then it begins to divide. (See *Fig.* 1, *b.*) The growth of vegetable as well as of animal tissue, depends upon the cell propagations, — the mother-cells always remaining as they were.

Fig. 2.

CORTICAL SECTION OF A POTATO BUD (AFTER VIRCHOW).

a. Outside epitel, under it the real epitel.
b. The mother-cells of the epitelium.
c. The real or starch-cell.

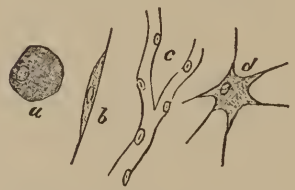
As will be seen in *Fig.* 2, vegetable cells in the same plants are not alike, nor do they have equal offices. But we find a still greater variety in the cells composing our own body. In *Fig.* 2 we have a vertical section of a potato-bud, *a;* we find cells which form the outside skin, and are flat; under them — a layer representing the real skin, at *b* —we observe mother-cells, which remain, and at *c* we see

starch-cells, which serve for the nourishment of the producing, and of other cells.

In *Fig.* 3 we see different animal cells. Their difference from vegetable cells is

Fig. 3.

ANIMAL CELLS (AFTER VIRCHOW).



a. Liver-cell.
b. Connective tissue cell.
c. How such cells unite to form a vessel.
d. A star-cell from a lymphatic gland.

at once apparent. *a*, represents a liver cell, — we may call it the chemist in our body; *b*, is a connective tissue-cell: it constitutes the framework; *c*, shows how cells unite to form a blood-vessel; *d*, is a cell from a lymphatic gland, and reprepresents a purificator. In

Fig. 4.

e. A cell from the small brain.
f. Blood-cells, seen horizontally.
g. Blood-cells, seen vertically.

Fig. 4, *e* is a brain-cell, and represents an organ by means of which we govern ourselves and others; *f*, and *g*, show blood-cells in different views. We may call the blood-cells travelling assistant chemists of our body. The blood-cells in an adult are the only ones which have no nucleus. There are many more kinds of cells which exist, but we cannot show them all here; bone — cartilage — skin — mucus — hair — epitelium, etc., etc., cells all of which have a different form and office in the structure of our body. Each cell is an independent living and working organism in itself, but at the same time is absolutely dependent upon the others.

As in the United States, each State of which the Union is composed is independent to carry on its own government, and regulate its own local affairs, while at the same time, as an integral part of the whole, it is dependent upon the general government, so each kind of cells carry on their own especial work, independent of the other groups; while at the same time each group, or kind of cells, as an integral part of the whole, is dependent upon all the rest. And what

a single individual may be as an elementary part of the whole state, such is a single cell in its relations to the whole body. As the detachment of a single State from the Union might lead to the entire destruction of the whole, so the detachment of a single *kind of cell* from the body would not only injure its structure, but in most instances would result in its ruin. And as an individual may have independence of action while subject to the law of his State, so each cell is independent in the carrying on of its own household, while it is bound to remain in contact with the whole as the law of its life. And as an individual separated from his own State may thereby lose his citizenship, as well as his connection with it, and be under the necessity of forming a new connection with some other State, so each cell, separated and detached from the rest, thereby loses its power of support, perishes for want of nourishment, and falls subject to law Number II.

Our body is a complication of millions of bodies — cells.

If all these cells perform their office in systematic order, we are in a condition of health; if, for any reason whatever, one or several of these cells become displaced or diseased in themselves, or injured, then we begin to be out of health, — sick, even although we may not always be conscious of it at the time. From this fact it will be evident that our study should be concentrated upon the office, the life, the place, and the nourishment of these cells. In view of these facts we are in a measure prepared to understand something of the very great changes which the discovery of this cellular principle is destined to make relative to medical science and practice.

From the earliest period in the history of the human race, it has been found that the body would sometimes get out of order, and become unfit for use, wholly or in part. As in general these phenomena came to the consciousness suddenly, and with peculiar symptoms, it was at all times an object to ascertain their cause and nature. That such explanations corresponded with the facts known at that time, and that they were imperfect in accordance with the imperfectness of knowledge, is self-evident. We read, therefore, the most curious and absurd theories about health and disease in old books. That people always explained everything which was incomprehensible to them as supernatural and most wonderful, is very natural; and we see a similar course pursued in certain directions every day at the present time. They, of course, distinguished between health and disease, and began to consider them as two *things* opposed to each other. And this same idea in different modifications continues largely to control medical practice, and is the basis of the various medical systems and errors. Different external symptoms and appearances were observed, collected together, and classified as special diseases; these were *personified*, and certain remedies and applications were used *against* such diseases, which remedies changed according to better or less comprehension and experience. To this very hour many physicians speak of remedies *against* fever; *against* scrofula; *against* consumption; while the remedy against these so-called forms of disease can be found

nowhere but *in obedience to physical and sanitary laws;* they even went so far as to invent remedial agents against diseases which did not exist at the time. Disease was considered as a something in itself, which could sit in the body hidden, or be born with it, or which could fly in the air; or could hide in certain localities or persons; which could go from one person to another like parasites, or remain attached to a family; which could be inherited and carried about in bags or in cloth. The old pathology called this "noxa." The attack of this noxa was divided into three sections: 1, the assault of the noxa was called "invasion"; 2, fight between noxa and organism, was called "reaction"; 3, result of fight was called "crisis." The most peculiar symptom, however, of this noxa was that it could never be seen, felt, heard, tasted or smelt; only the effects were seen, and these were sometimes mistaken for the noxa itself by some, while the most intelligent medical men considered it something spiritual, and too fine to be perceived at all.

If we should walk about the street and at once observe the pavement to burst open with a loud report, and perceive at the same time that an offensive odor was emitted, or that water was flowing about in streams, we should not be frightened, because we should know that a water-pipe, gas-pipe, or something of the kind had burst. I say we should know, because we have seen the pipes laid; but if we take an Indian from the Rocky Mountains, he would know nothing about it. The Indian would give an entirely different explanation of it from what we should. We know that pipes are there; that an iron water-pipe or gas-pipe may rust and burst; that it might also be obstructed by rags or paper, or that the force of the water might be in undue proportion to the strength of the pipe. We also know of the various and different pipes that are under the street, but the Indian could not possibly know anything about them. He would explain everything as well as he knew how, and no better. Now the same picture applies to our body. We have in us pipes, streets, pavements, offices of all sorts, telegraphs, laboratories, laundries, etc., etc., only we have different names for all these. We call them arteries, veins, intestines, epiteliums, glands, muscles, bones, nerves, skins, etc., etc. If we know them all, we are enabled to tell what might possibly happen to them, and make a diagram of it with the pencil; we can know what we have to expect, and what not.

Yet there are a great many things which are entirely new, and in regard to which we are like the Indian about the water-pipes. For example: we have a pain in our muscles; we say, "We have the rheumatism," but we do not know what rheumatism is. We cough, and say, "We know we have got a cold," but we do not know what a cold is. We say, "We know we have a fever," but we do not know what fever is. We say, "We have got such or such disease," but we know nothing at all about this or that disease. But if we knew all the pipes, and the metal they are made of, and their contents, and their purpose, and the conditions under which they stand, then we should not say we have got cold, or fever, or rheumatism,

but we should say we have injured several of our muscle-cells or cutaneous-cells, or we have overloaded our blood with albumen; or we have a clot in one of our capillary vessels; or we have a deposit of such and such crystals, etc., in such and such joints; or we have paralyzed such a nerve by such and such foolish action, etc., etc. If we should get blind because our lens becomes darkened, we should go and have it taken out, because we know that this can be done; we would not submit to a dose of medicine, nor to an eye-wash, nor to a wonder-cure, nor to a voyage to the West Indies or to Europe, because we have learned better. Now let us take this lens as a small cell in our blood, and let it become darkened there, and let it interfere with the action of the others, and get caught in the lungs or in the liver, or intestines, then we are willing to submit to almost anything; to swallow medicine, to doctor with regular and even with quack physicians, travel, suffer, — to be humbugged again and again; and why? because we do not know better!

We now come to the difficulties which may occur to our cells. The conditions for normal cellular life are, 1, the correct place; 2, correct nutrition; 3, correct pressure. Too much or too little of each or all will have the same effect, namely, to render the cells unfit for office. A blood-cell belongs in the blood-vessels, and nowhere else; if for any reason it escapes, it ceases to perform its proper functions, and acts as a foreign body wherever it comes, to the disadvantage of all other cells. A liver-cell in the brain would be as appropriate as fire would be in an ice-house. If a cell is not sufficiently nourished, or is nourished with improper material, it begins to sicken, and dies; it then becomes dangerous to the rest; or, if it is over-nourished, especially with one-sided, unfit material only, it begins to grow, produces new cells which are for no purpose, thus causing abnormal growth, or they wander about as good-for-nothing vagabonds, of which cancer-cells form an example. If the pressure is too much or too little, the cells become paralyzed, and stop working at once, until freed again, or otherwise they perish. The different changes which we observe in cellular life we divide into active and passive, both of which are dangerous for the commonwealth under certain circumstances. The active degeneration of cells consists always in the production of newly-formed elements, such as cancers, tumors, abscesses, etc. The passive ones consist in a slower or quicker death of the cells themselves. We can have active and passive degeneration at the same time, as the newly-formed elements die for lack of room and nourishment. It is remarkable that the lowest order of cells in the body, the connective tissue cells — see *Fig.* 3, *b* — are the most dangerous ones as regards active degeneration. All cancers and tumors owe their origin to these cells. When such a cell becomes extraordinarily irritated, it swells and buds; and the quicker this is done the more dangerous it is. These newly-formed cells become dangerous by their rapid self-propagation (cancer), or through the pressure which they bring upon other cells (tumors). It is seldom, perhaps impossible, that muscle, liver, or other cells become dangerous by active de-

generation, but they become so by passive degeneration. Passive degeneration begins with inactivity of office, which continues until the death of the cell. The cell first begins to show a cloudiness inside; next distinct flakes can be observed; then the cell begins to shrivel, and may entirely dry up; or its nucleus begins to change into fat, and by and by the whole cell exhibits no nucleus at all, but again appears clear and yellowish, containing nothing but clear fat. Such cells can remain in the body a long time without doing material damage, save in their inactivity; but their bad influence will be felt in emergencies. The most dangerous cells, in passive degeneration, are the blood-cells. We have two kinds of blood-cells — white and red ones. Their proportion in health is one white to about three hundred red ones; in abnormal conditions of the body, the white ones increase so much sometimes, that the blood appears whitish. These white cells, in undue proportions, are dangerous, on account of the slowness with which they move, and their liability to obstruct the blood-vessels. They are newly-formed cells, and in any injury to the organism, or in cases where new cells are needed (pregnancy), their number increases. Both white and red blood-cells become very dangerous when they escape out of the vessels, or when their course becomes interrupted in the vessels, causing stagnation. They then accumulate into a mass, where they die after some time; as soon as they begin to die, they commence to infect the other cells surrounding them. Their effect may be compared with dead or decaying corpses in a community.

Under such circumstances the body expels them in forming an ulcer. But in case this cannot be done, the body has the power to bury them inside of it by enclosing them in lime, in which coffin they remain in the body without harm. This is called natural calcification of morbid cells. Upon this fact is based the artificial calcification, by the discovery of which we can arrest the decay and formation of tubercles in pulmonary Consumption, and thereby effect a complete and radical cure of this dreaded disease, provided the substance or framework of the lung itself has not already been destroyed. All surgical and medical aid can consist in nothing but in aiding the body in its resources and self-actions. The amputation of a limb, when necessary, is nothing more than the act which the body tries to perform for itself. The opening of an abscess is simply the aiding of the natural purpose of expelling diseased cells. When diseased cells or other foreign substances are in the body, it begins the process of ejection by increase of action — fever. Fever, therefore, is not a disease in itself, but the sign of the very life of our body. Without it we could not recover from any injury whatever. To help the body in the purpose of this process, is the office of the physician. *How*, we shall illustrate on several well-known processes.

We know that blood is formed mainly from the substances we eat; if we eat improper substances, normal blood cannot be formed. If, for example, we should eat nothing but potatoes, there would be a lack of sodium, and of other minerals in our blood, because pota-

toes contain little or none of them. We also know that if we should give to a child hard boiled eggs, its stomach would most likely revolt against such intrusion, and eject them, or if retained, the digestive organs would be maltreated, and become disordered; thus the whole blood-producing apparatus gets out of order. We can also easily comprehend that by over-feeding a child we overload its blood — the more since a child's intestinal canal absorbs better and quicker than that of an adult. In short, everybody will admit, that, ignorantly or otherwise, we can injure a child's digestion, and produce thereby incorrect blood; for example, if we give a child too much albumen and too little salt, its blood will contain a mal-proportion of albumen to the necessary salt. Without a poison or a malformed substance in it, this blood is abnormal. Such a child will not immediately feel sick, nor appear so, but seems all right, —perhaps a little too fat-looking, and a little too pale. The body, however, is busily at work to re-balance this blood; the kidneys, skin, lungs, and intestines are engaged all the time in ejecting the albuminous surplus, while the intestinal nerves telegraph for salt by the taste. The mother, however, forbids salt, — the child cannot get it, and has to eat sugar instead, whereby the taste as well as the economy is directly cheated. The body is thus absolutely prevented from helping itself. Now, for some reason, let the perspiration through the skin or lungs be checked for a time; had the child been absolutely well, this would be followed by no bad consequences, but the abnormality of the blood becomes of consequence *now*. The skin reports to the stomach its strike; the stomach reports to the mouth — *Stop*. The child has lost its appetite. The bowels or kidneys have to perform the duties of the skin; but, already over-busy, they cannot do all. Now the machinery gets out of order, — the child feels sick, and wants to lie down; the pulse begins to work for reparation, — the child has fever. The blood-cells have to work harder, and produce out of the albumen fibrin in abundance; until overladen with fibrin the blood has to throw off a portion of it, — this may occur anywhere; in the lungs, throat, or intestines, etc. The tonsils swell, so does the mucous membrane. Now the child craves acids instead of salt; but again it cannot get it. Under such embarrassing circumstances the body helps itself as well as possible. All involuntary motions are controlled by one nerve, which is called the *sympathetic* — it is the nerve which controls our animal economy. In this case this nerve, after a period of useless strain, will relax its power, and partially give up service. The immediate consequence is the relaxation of arterial contractility in several parts of the body, generally those of the *periphery*. If, on the outside periphery, we observe red patches or pustules on the skin — if on the inside periphery, we observe the same in the mucous or serous membrane of the intestines, of the lungs, etc. — and, in extreme cases, in the linings of the brain or spinal column, paralysis being the immediate consequence. Wherever this relaxation takes place the circulation of the blood becomes arrested, and deposits take place according to the mixture which formed the ab-

normality in the blood. *Here now begin those processes which the experience of former times has classified as diseases.*

The observed relaxation of arterial contractility has been termed, in pathology, "hyperæmia." According to different outside symptoms and appearances, this was called scarlet fever, measles, small-pox, or chicken-pox, etc., if in the skin; brain fever and apoplexy, etc., when in the brain; hooping-cough, bronchitis, pneumonia, etc., if in the lungs; cholera, dysentery, typhus, etc., if in the intestines; croup, diphtheria, etc., when in the throat, etc., etc. The circumstantial *results* of a process were considered *the disease*, and against this the battle was begun. The most absurd theories and remedies were invented, but, as with our Indian, the pipes and their metal were not known. We see, from daily experience in medical practice, that often when the organism has nearly finished a process of struggle, it is even then subjected to an imaginary specific, and to other hocus-pocus into the bargain, instead of being left alone to perfect its own recovery.

For example, take scarlet fever: it always begins with loss of appetite; then fever and sore throat; then red patches; then recovery, or otherwise quick or slow death, according to circumstances. To arrest its course, and to prevent its ravages, medicines and manipulations *ad libitum* have been tried in vain; for more children die of scarlet fever now than one thousand years ago. But why? Because that nothing, absolutely nothing, is as yet known as to what scarlet fever is; and, what is still worse, there was, until recently, no need felt of such knowledge.

It is as unnecessary for a child to die of scarlet fever as it is that it should be blind with cataract. Let us see: at any time before the body has finished its ineffectual struggle we are able to help it, not by wonderful medicines, but by the knowledge of anatomy, and the application of common sense. We consult the sympathetic nerve, and do what it commands us to do. We must give this child salt when it wants it; we must give it acid when it has fever and anxiously craves it — not vinegar, but lemon-juice, because the first coagulates albumen, the latter does not, on account of the surplus of oxygen which it contains. To imitate the soothing mucus in the intestines, which is now wanting, and to give some respiratory food at the same time, we add some gum-arabic. To restore and relieve the injured nerve, we apply moist warmth.

In practice we can fulfil all this with the following simple manipulations: Undress the child and bring it to bed at the very first sign of sickness. Give it, if it has fever already, nothing but sourish warm lemonade, with some gum-arabic in it. Then cover its abdomen with some dry flannel. Take a well-folded bed-sheet, and put it in boiling hot water; wring it out dry by means of dry towels, and put this over the flannel on the child's abdomen. Then cover the whole, and wait. The hot cloth will perhaps require repeated heat. According to the severity of the case, and its stage of progress, perspiration will commence in the child in from ten minutes to two hours. The child then is saved; it soon falls asleep. Soon

after the child awakes, it shows slight symptoms of returning inclination for food; help its bowels, if necessary, with injections of oil, soap and water, and its recovery will be as steady as the growth of a greenhouse plant, if well treated. Of course, if the child was already dying, nothing could save it, or if it has already effusions in the lining of the heart or brain, it is much better that it should die. But if the above is applied in due time, under the eye and direction of a competent physician, I will guarantee that not one in a hundred children will ever die of scarlet fever. I know this will startle some of my readers, especially those who have lost children already, but I shall go still further. I maintain that a child will never get scarlet fever if properly treated. If a child has correctly mixed blood, it will not catch the disorder if put in bed with a sick child. This is still more startling, but nothing is easier of proof.

We shall illustrate another process: We meet a friend to-day who is perfectly well. We find him to-morrow on his bed, sick: his respiration is difficult; his pulse is quick — 120 per minute; his skin is dry and hot; his reason is impaired; — evidently he seems dangerously ill. We ascertain what happened to him, and find that he is under the influence of alcohol. We go away, and laugh; we do so *because we know this process*. A week afterwards we find this same friend, who was perfectly well again, once more in bed; his pulse is again 120 per minute; his skin is again dry and hot; his respiration is again difficult; his reason is also impaired, and he looks wild and anxious. We find that, on this occasion, he did not drink; we do not laugh now, because *we do not know the process* this time. We therefore send for a doctor, who says our friend has pneumonia. Our friend gets worse and worse, and finally dies, in spite of care and doctors. We are determined to know what killed him, and make his post mortem examination. We open his brain, and find nothing but a little more blood than usual. His heart is perfectly healthy — the right ventricle filled with blood, the left one empty. We examine the lungs — they are dark red, and heavy. We have found the disease. We take a microscope, and examine those lungs; we find nothing but normal blood-cells and coagulated normal fibrin; but we cannot detect anything strange in it. We inoculate a dog to ascertain if a poison is present, but the dog remains perfectly well — there is not even a poison there. We examine the intestines — the whole body; we cannot find anything strange whatever. However, we are determined to find the reason, and ascertain the following: Our friend, by reason of his spree, got behind his business, and was consequently obliged to work and run more than usual. He was a strong man, in the full bloom of life, and used to live pretty well. This unusual exercise, as a matter of course, caused a quicker circulation of the blood — the more as he had abused his body by excessive alcohol drinking; but, forgetting himself, he ran all the time without hesitation against a strong wind. His heart began to pump the blood into the lungs with extraordinary force; and, in the hurry and excitement, he could not breathe fast enough to counteract, by breathing, the increased pressure of the heart;

through the unequal balance of pressure upon the small vessels of the lungs, they became extended beyond their capacity, thus they lost their elasticity and contractility. The circulation of the blood through them became interfered with, and the quantity of blood thrown into them by the heart exceeded their volume. They burst; and the parenchyma of the lungs thus became filled with blood, which unfitted them for respiration. The organism was prevented from receiving the necessary oxygen for living, and that was the reason of his death — he suffocated. It was not a disease, but the injured mechanism of the body that killed him. Could we have cured this man? No, we could not. Here we are entirely helpless. If the injury to the lung is so extensive as to prevent respiration sufficient for continued life, then no earthly power can save the patient; on the other hand, if enough lung is left for respiration, the patient will recover with certainty, and without any help save rest and attention. All we have to do is not to prevent his body from helping itself. But if he had known the anatomy and physiology of the lungs, our friend would never have got into this trouble at all. It was simply the want of the knowledge of the pipes and their purpose which brought him to an untimely end.

Now I have given two pictures of so-called disease. Was there anything mysterious or wonderful about them? Did we find anything hidden, or anything which is to be driven out? I could give picture after picture, but we should never find the "it," the disease, or noxa of former times. But you will ask how is it with malarial diseases, so-called? Is there no poison? There is, but nothing wonderful about it. If I open a gas-pipe and make you breathe the gas, you will get sick with absolute certainty. But coal gas is no disease; neither is foul air, or gases which are produced in swamps or dirty localities. The late Prof. Seyfort, of Prague, used to say, "There is but one disease that is incurable — it is stupidity."

Science has thus demonstrated that such a thing as an individual disease, an enemy to health, to humanity, has no existence whatever. *Health and disease are subject to the same laws; they are manifestations of the same powers. Disease is that state of the body in which the normal physiological laws manifest themselves under abnormal conditions.* If we know these laws, and the conditions, then we know the disease, or rather disorder. And if we know and comprehend the disorder, we can know what to do and what not — *and only then.* The reason that certain forms of disorders will instigate the same forms in other abnormal blood in preference to others, we find in our law No. II., and these forms will be the more identical the nearer the direct influence and the same conditions had a chance to act. The form of its outside symptoms has very little to do with the disorder itself. Albumen in excess is bad, whether it exudes in the throat, or brain, or joints, or lungs, or intestines — in each case we should observe different symptoms, while in each case the same cause prevails.

That a knowledge of this is very important for the treatment, is self-evident. The material which balances the albumen in our blood

is salt, common table, or any other similarly acting salt. Nothing else, be it homœopathic, allopathic, eclectic, spiritual or wonderful, can be of any use as a substitute for salt, which, according to a law established and well known in physiology and chemistry, meets the case. Anything and everything else in the shape of medicines are not only positively useless, but absolutely absurd.

Everybody knows, or ought to know, that the human body is composed of but fourteen different elements; and a child can comprehend that when one of these elements is wanting or deficient, that this element which is wanting is the remedy, and nothing else; e. g., if oxygen is required, we want oxygen, and nothing else. No medicine whatever, be it allopathic, homœopathic, or made by Æsculapius himself, can replace oxygen. If we lack lime, we want lime, and not bromide of potassium, or the one-millionth dilution of charcoal. If we have in our blood albumen, minus sulphur, we then want and need albumen plus sulphur, and nothing else. With no medicine in the world can we make normal albumen. From this it must appear that a *perfect understanding* of each and every process in question must be at the foundation of all medical treatment, and not *this* or *that* system of medical practice, which necessarily fails in this fundamental principle, and becomes puerile and absurd.

The understanding of the various processes is the object and purpose of science. We must, however, confess that medical science knows but little in comparison to what it does not know; but what it knows, it knows with absolute and unfailing certainty. Especially in America, I have often heard it said, that medicine was behind the other branches of natural science. The truth is, that all other branches of natural science are nothing but handmaids of medicine; originated by medical men, sustained by medical men, appropriated by medical men. Anatomy, physiology, chemistry, botany, mineralogy, physics, zoology, geology, etc., are only the pieces which constitute medical science. The mistake generally made, is to confound medical routine with medical science; they have about as much to do with each other as the boarding-house shark has to do with the steamship company.

The insufficiency of natural science is the drag-chain of medicine. If any of the above branches have for their object (as may be sometimes the case) the classification of unimportant species, or simple curiosity, or self-glorification, or the like, they cease to be science, and begin to become a farce. Science, without a direct purpose for the human race, has no point or sense, and does not really exist.

Anatomy and Physiology of the Lungs.

THE vital blood in its ceasless nourishing current, requires restitution of appropriated, and expulsion of effete, or useless material; and the glands of our body are the organs by which these offices are performed. But we distinguish between single, or small glands, and complicated, or large ones. The first are represented by the dermal, intestinal, mucous, etc., glands; the others by the lymphatic, saliva, and progenital glands,— the kidneys, spleen, liver, and lungs. All these glands, in their outlines, exhibit a similarity of construction, but in their more minute details they differ materially from each other, in accordance with the various offices which they have to perform. These glands constitute a continued chain of laboratories, each of which performs its own especial part of the work to be accomplished by the series; and keeping these facts in view, it will not be difficult to comprehend, that if even one of these laboratories of the whole chain, or series, ceases to perform its offices, or to perform them imperfectly, the others must necessarily suffer in consequence. And since these glands hold such intimate relations to each other, it must be obvious that in study it is not possible absolutely to isolate any one gland beyond a certain degree; therefore, in specifying the lungs only, it is taken for granted that the reader already possesses some general idea of glands and their office, as otherwise it will not be possible for him fully to understand what may be said on this subject.

The office of the lung is to intermediate the exhalation of used gases, and the absorption of required fresh ones. Its office is therefore a double one. But before we can know how it performs these two offices, we must look at its material and construction. Let us imagine two large elm-trees *without leaves*, with hollow trunks and branches, even the very smallest ones, accurately tied together, having all their finest branches united to one another in such a way as to admit of fluid passing through them from one trunk to the other. We will next imagine that the crown of one large oak-tree, with hollow trunk and branches, having its *leaves on*, is carefully pushed into the crowns of the two elms, and that from each oak branch to each elm branch there is interwoven, by means of a very small india-rubber thread, a web somewhat resembling that of a spider, in such a manner as most thoroughly to connect them, and we have a somewhat exact, though rough picture of the lungs. In this picture, the hollow trunk of one of the elm-trees is made to represent the vessels which carry the blood into the lungs (the lung-arteries); and the hollow trunk of the other, the vessels which conduct the blood out of the lungs (the lung veins); the thin leafless branches of the two elms, represent the net of capillary blood-vessels in the lungs. The hollow trunk of the oak represents the trachea or windpipe, the

branches the fine bronchi, and the leaves of the oak the alveoles, or air cells of the lungs. (*See fig.* 1.) The web formed from fine india-rubber thread, represents the elastic connective tissue, which, by forming very minute square meshes, plays a very important part in respiration, and gives to the lungs great elasticity.

Fig. 1.—A branch of the lung bronchi before ending in the alveoles. After Henle.

The two lungs (left and right) have somewhat the appearance of a sugar loaf, and occupy the whole cavity of the chest, leaving only a small space between them for the heart. The lungs do not adhere to the walls of the chest, but move freely in their cavity by means of a double membrane, called the pleura. One sheet of this pleura covers the inside of the chest, the other the outside of the lungs, and both move one upon the other in every motion of the chest. These membranes are exceedingly sensitive, and any little injury done to them is extremely painful, while the lung tissue can be torn without any direct pain whatever. The lungs are made still more elastic and movable by being divided; the left one into two parts, and the right one into three. By means of this construction the lungs can be used freely in any bending position of the thorax, without pulling or tearing any part of them. Each large lobe—of which there are five—is again divided into several smaller parcels, which somewhat resemble the water-tight compartments of a steamship, and are called lobuli, or small lobes, which are separated from each other by a membrane, the object of which is to protect the other part of the lungs in case of injury or inflammation of one of the small lobes. In the middle, that is between the two lungs, the heart is placed, which also consists of two parts, the right and the left heart, the latter of which is by far the strongest and most powerful. The right heart, however, has all the power required for pumping the collected blood from the body into the lungs, and thus keeping up a continued flow through two large vessels, which, although they carry venous, and *not* arterial blood, are called lung-arteries. These two arteries branch out into smaller ones, and these again into still smaller ones, and continue to do so, until they reach the extremely fine capillary hair net of vessels which are neither veins nor arteries, and which have, of themselves, no power of muscular contraction, except that which exists in their own original cells. The fine capillary vessels wind themselves back and forward in a serpentine manner, and therefore have a longer course than ordinary blood-vessels. Their walls are exceedingly thin, penetrable for the blood-water (*serum*) only, and the blood moves in them slower and more irregularly than in veins and arteries, sometimes swelling them up, or enlarging them a little, and allowing them to contract again to smaller size. The power which moves the blood through them is not the heart, as has been supposed, but the act of respiration, as will be shown further on. The blood having passed these long, winding capillaries, enters into the lung veins, having now a fresh and lighter appear-

ance, from whence it is drawn into the left heart, to be immediately forced through the whole body with a power almost inconceivable.

In the lungs, in between the extensive net of blood-vessels, are found a very large number of small oval bags, which, in life, go up and down like bellows. These little bags are the air-alveoles, or air-cells (of the lungs), the walls of which are exceedingly thin, but of an entirely different structure from the walls of the capillary vessels, permitting nothing to pass through them but oxygen, or a gas of similar thinness. From four to six of these bags enter or open into the smallest bronchi, or so-called capillary bronchi, and these last into larger ones, and so on until the trachea or windpipe is reached.

The lining of these bronchi is very peculiar, consisting of a hairy coat, the hairs all standing with their ends towards the mouth, and in continual motion, so that if a light substance is put upon it, it will invariably be moved in the direction of the mouth, and never towards the lungs; hence all the dust which is inhaled, is caught by this fine hairy epithelium, and moved up again.

The air alveoles, the elastic tissue, and the capillary vessels, are the three actors, or agents, by which the office of respiration is performed, although several other organs are necessary, from the aid which they render, in maintaining them and their office. There are vessels which serve as purificators of any possibly left sediment or waste, by taking it up and carrying it into filters for purification. These vessels are called lymphatics, and the filters, lymphatic glands, which play as important a part in connection with the lungs as the gutters do in connection with the streets, or the safety-valve, the steam-engine. To bring the heart and lungs into general communication and harmony with the body at large, two nerves are employed. The first is called the pneumo-gastric nerve or vagus, and governs the motions of the heart and lungs. It originates in the brain, descends to the neck, then sends a branch to the thorax, and terminates in the stomach and liver. For the nutrition of these organs, another nerve, called the sympathetic, is employed. It does not originate in the brain, like the pneumo-gastric nerve, and has no single centre, but is spread all over the body like a large net. It sends a large branch to the chest, connecting with the vagus, and these together form the plexus pulmonalis of the chest. These nerves are everywhere accompanied by an independent net of blood-vessels, which serve only as nutritive agents, and are of less importance than the other blood-vessels in the chest. The complication of these two nerves (the pneumo-gastric and sympathetic), together with branches of the spinal nerves, control and facilitate the motions of the heart and lungs in exact correspondence with the rest of the body; and being connected with the digestive apparatus and with the brain, they demonstrate the direct relations between these organs and the heart and lungs.

The lungs (a spongy, fragile, and very elastic organ) are protected on the outside, by the ribs, and by their ligaments and muscles, the construction of which is very curious and extraordinary.

They are movable in all directions, elastic like a steel spring, intensely strong, and secured against injury from the outside. Towards the abdomen, the lungs and heart are separated from the stomach, liver, and intestines, by a muscle, which, by means of its spiral fibres, is also exceedingly elastic; so much so that, even were the bony part of the chest by some accident to lose its elasticity, respiration could still be carried on by means of this muscle. The frame of the male chest is very much stronger and less elastic than that of the female. By means of this superior elasticity of the chest in woman, she is able, when *enceinte*, to breathe freely, without the aid of the diaphragm; but were it otherwise, she would nearly suffocate. It will be noticed that a man, when out of breath, elevates his abdomen, and a woman, under like circumstances, elevates her chest. Hence we distinguish between a pectoral and an abdominal breathing. The experience, that lacing around the waist is much less injurious for the female than it is for the male, rests upon the fact, that the former has the power of breathing entirely from the chest, which the latter does not possess. It is this elasticity of the chest, as we shall learn further on, which constitutes the principal reason that a certain and invariable experience has been observed, though never explained, — that consumption in woman is always more or less arrested when she is *enceinte*. Having thus given a brief outline of the elements which constitute our respiratory organs, our next object is to present them in a state of operation.

The Mechanism of Respiration.

It is demonstrated in all books of physiology, and in all medical schools, that the combinations of the oxygen of the air with the blood, and the exhalation of carbonic acid from the blood, is effected according to a law of nature, as established by Henry and Dalton, which is called the law of the diffusion of gases. As no two substances exist which exhibit the same weight, any two liquids or gases have the absolute tendency to equate the difference by diffusion, or mechanical mixture; the same thing being called chemical affinity when applied to chemical combinations.

As the blood-globules, as well as the fibrin of the blood, have the power to absorb oxygen from the air by chemical affinity, it was thought that the rest of the mechanism of respiration was performed by direct mechanical diffusion of the carbonic acid gas from the blood with the oxygen in the alveoles. The incorrectness of this theory was discovered by the writer. It has also been acknowledged by Prof. Traube and Prof. Hermann, in Berlin, that such process is impossible. The former advanced, that an unknown ferment agent might be the means of the process, while the latter showed that the amount of carbonic acid gas in the alveoles is larger than that in the blood, and therefore that a diffusion of carbonic acid from the blood into the air-cells, is absolutely impossible.

The following theory upon this subject is the result of a laborious and long-continued study. The accompanying cuts (*Figs.* 2 and 3)

are designed to represent the mechanism of respiration; being a semi-schematical view of the extent of inspiration and expiration. When the alveoles or air-cells are extended by the air taken into them by the act of inspiration, the meshes of the elastic tissue are necessarily compressed, as represented in *Fig.* 2; while on the other hand, when the air is expelled from the alveoles by the act of expi-

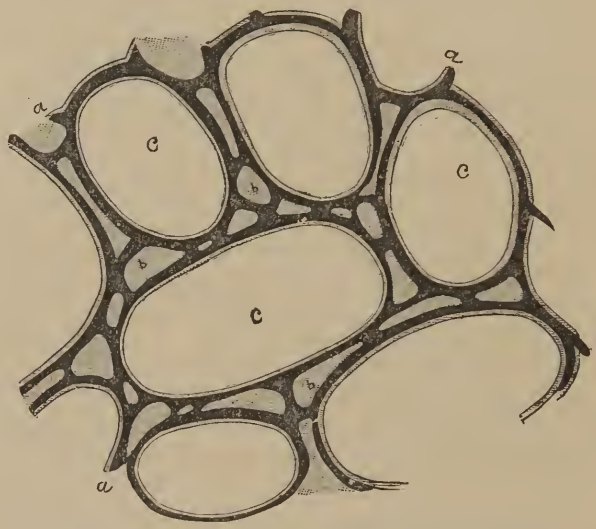


Fig. 2.— A semi-schematical microscopic view of a piece of the lung at full inspiration. *a a a*, capillary blood-vessels; *b b b*, elastic tissue; *c c c*, alveoles.

ration, they are extended, as represented in *Fig.* 3. It is by means of this extension and compression of the elastic tissue that the exchange of the gases of the blood with that of the air is effected. The walls of the capillary vessels, here, as everywhere in the body, admit the blood-serum to pass through them, while the blood-globules and the fibrin, under normal conditions, must remain inside or within the capillary vessels. Therefore, when the meshes of the elastic tissue are extended by the act of expiration, and the pressure upon the capillary vessels correspondingly diminished, the blood-serum runs into and fills the volume of the meshes, and is the medium by which the used carbon is carried to be discharged. The expansion and contraction of the alveoles or air-cells, as has already been shown, is occasioned by the air which enters them on each act of inspiration, and leaves them on each act of expiration. But the air, as is well known, is composed of the two gases, oxygen and nitrogen; and, on the average, consists of about twenty-one per cent. of the former, and seventy-nine per cent. of the latter, exclusive of the moisture and other mixtures in it. The oxygen of the air enters the body through the walls of the alveoles, which, in some measure, comes back again as a part of the carbonic acid exhaled; and in some measure is carried into the blood and enters the blood-globules, by entering with the blood-serum into the capillary vessels. The

nitrogen, on account of its greater density, cannot pass the walls of the alveoles under normal circumstances, but serves as a mechanical agent to extend them. It is therefore just as necessary in the economy, as oxygen. A man could breathe but a very few minutes in pure oxygen, and he could breathe about as long in pure nitrogen. The one is the necessary chemical substance for life, the other the

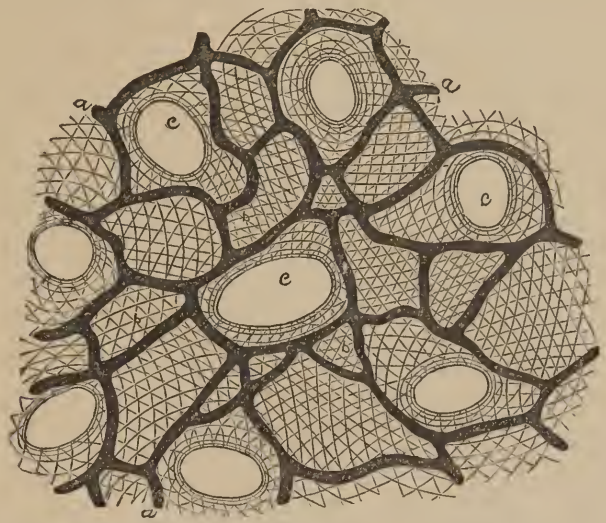


Fig. 3 — The same as Fig. 2 at full expiration. *a a a*, capillary blood-vessels; *b b b*, elastic tissue; *c c c*, alveoles.

necessary mechanical motor; hence both are equally necessary. The fact of the different actions and density of the two gases was discovered by the writer some twelve years since, but was experimentally proved by the lamented Graham, of London; who, by filtering air through india-rubber shavings, succeeded in increasing the percentage of oxygen to forty per cent., or to about double the quantity usually found in the air. By this experiment, he has proved beyond a doubt, that nitrogen is more dense, or thicker, and therefore less capable of penetrating, than oxygen. (See *Scientific American*, May 1, 1869, page 279.) The capillary vessels are so constructed as to admit of the passing of the serum through their walls, but not of common air; and the alveolar walls will admit of the passage of a thin gas, as oxygen, but not of any liquid whatever, nor of a gas more dense than oxygen. The meshes of the elastic tissue constitute the point where the two meet. When the meshes are compressed by the act of inspiration, the blood-liquor (serum) is forced back into the capillary vessels, and the gases into the alveoles. And since the serum passes more readily into the meshes than back into the capillary vessels, the act of inspiration is performed more slowly than that of expiration. For the act of inspiration, by compressing the meshes of the elastic tissue, forces back the serum into the capillary vessels, and thus causes the blood to move onward, while by the act of expiration the blood is momen-

tarily stopped, and hence the microscopical observation that the blood sometimes apparently runs backwards in the capillaries of the lungs.

The blood itself consists of solid and liquid matter, which is partly organized, and partly only held in solution. The blood-globules are the organisms which perform the necessary chemical changes in the blood while circulating. They are little cells, which have a diameter of one three-hundredth of a line, and are very flexible. They have a round, though somewhat flattened form, and are red in color. In addition to the red cells there are also white ones, which are usually a little larger than the red ones, and contain nuclei and granules, which the red ones do not. The way in which the blood-cells move in the blood-vessels is very peculiar. The red ones always move in the middle or centre of the vessel, never touching its walls unless their current is stopped, and much quicker than the white ones, which roll along slower, and on the walls of the vessels. (*See fig.* 4.)

Fig. 4.—A microscopic view of a capillary blood-vessel, showing the red globules in the centre, and the white ones, which move slower than the red ones at the wall. *a a*, red globules; *b b*, wall of vessel; *c c c*, white globules. After Virchow.

The other component parts of the blood, are the different forms of albuminous matter, called in bulk, protein substances; they are globulin, fibrin, albumen, casein, etc., etc., and the blood salts, which are partly united with other matter, and partly only solved in the blood-water. The fibrin is capable of shaping itself into a certain form, and under normal circumstances, like the blood globules, always remains in the vessels, while the other albuminous matter is entirely shapeless, and penetrates the walls of the vessels to nourish the tissues. The blood circulates in the lungs, for mechanical reasons, slower than in any other part of the body. Its flow is also unsteady and interrupted, which does not occur in any other organ. The peculiar construction and functions of the lungs, therefore, make them subject to diseases which we do not observe in any other organ of the body.

A thorough and comprehensive knowledge of the process of respiration is essential to the right understanding of Consumption; therefore all who wish to understand future explanations, should, as far as possible, make themselves acquainted with it.

To recapitulate: — The right heart pumps the venous blood into the lungs, forcing it onward until it reaches the capillary vessels, where its power ends: the blood then moves slower and interruptedly, on account of its absorption of new oxygen, and the unloading of carbon, which is accomplished by the meeting of the blood-serum with the oxygen in the meshes of the elastic tissue. The alveolar walls being impenetrable for nitrogen, are extended by each inspiration, which, by pressing back the elastic tissue, forces each to its respective place again (the gases in the alveoles, and the blood-serum in the vessels), and thereby forces the whole blood to move onward towards the lung veins, from whence it is drawn into the auricle of the left heart, and diffused by the very powerful left ventricle through the organism, returning again into the lungs in about five minutes.

It appears that no direct contact between the whole blood and the air exists, but that both send a representative which meet in the meshes of the elastic tissue, exchange gases, and return again to their respective places. The nitrogen of the air was supposed to be only necessary as a dilutive element to the oxygen, but instead of this, we find that it constitutes the mechanical power which drives the blood through the long winding capillary vessels, by extending the walls of the alveoles. The breathing of pure oxygen produces acute pneumonia, and it has been supposed that this was owing to its too intense action; but we maintain that it is because that the blood in such case cannot pass the lungs, not having the mechanical agency of the nitrogen to extend the alveolar walls, and press back the elastic tissue; consequently the law of the diffusion of gases does not come in question, until the gases meet in the alveoles and bronchi before being exhaled. It is owing to a misunderstanding of this process of respiration, that all theories and investigations in regard to Consumption have been confused and of no avail, while, if based upon it, any and all phenomena may be easily and logically explained.

General Pathology of the Lungs.

THE physical or natural laws by which the universe is governed are invariable and absolute in their operation, and hold in subjection and under control the mere molecule, as well as the grandest structures of creation. A law of nature, therefore, is one which does not admit of exceptions in any case, but is always, in all cases, and under all circumstances, absolute and infallible; and consequently any law, or supposed law, which does not fulfil these conditions, cannot be a law of nature. But to discover and to demonstrate the laws of nature, is the great and sole object of science. One of the primary laws of nature is, that there is no absolute immobility, or cessation of motion, in any part of, or in the whole of the world. Our senses, it is true, may not be sufficiently acute to enable us to perceive a motion, but there is one, notwithstanding. What we call death, is a relative expression referring to a change of form; but real or absolute death has no existence anywhere, except in name. If the evolutions among the elements which constitute everything, go on with a certain steadiness to our observation, we speak of such a condition of things as being *normal*. But if a change occurs in this apparently usual current of things — the cause of which may or may not be known — we speak of this changed condition of things as being *abnormal*; although, in reality, there is nothing abnormal about it, except in *appearance*. As everything in nature is governed by fixed and absolute law, there can be no such thing as an evolution, a change, or development, outside or independent of it; and, therefore, nothing that is strange, incorrect, or abnormal. The vanity of ignorance, however, in connection with feebleness of conception, the circumscribed area or field of observation. and the folly of men in considering themselves as being outside of the laws of nature, has been the occasion of introducing into our dictionaries a class of words of which disease, abnormality, corruption, etc., may serve as representatives. The various changes of the kind referred to which take place are but the result, or consequence, of some influence of motion, which may, or may not, be known. Hence, in point of fact, such a *thing* as a disease has no existence; that which is usually so called, being only an unusual phenomenon to us, produced by certain causes, which to discover is our object, and which to demonstrate, in reference to Consumption, is our present purpose.

The object of the various branches of science is to recognize and understand the laws of nature; which, being universal, are the same everywhere. And hence medical science has for *its* object the recognition of these same laws in connection with the human organism, and the various *branches* of medical science, the application and use of them in the smallest details of the body. That particular part of medical science which treats of the unusual, or to us abnormal conditions under which these laws manifest themselves, is called

pathology; — that which has reference to the laws that are applicable to all parts of the body being termed *general*, and that which has reference to the laws which apply to one condition only, *special pathology*. The general pathology of the lungs is consequently the same in principle, as for other parts of the body.

The life process, under certain and mathematical laws, requires a constant, equal, and uninterrupted motion of all molecules belonging to the organism; we therefore call that process which occurs when one or several molecules, for some reason, are prevented from following these laws, the primary cause of any and every disorder or disease. This interruption of motion (*Stasis*) would constitute the primary irritation (*Reiz*), which would be followed in each and every case by such consequences as the circumstances would permit. These consequences constitute those conditions which come under our observation, and are called by different names, according to their different appearances, and the places and organs where they show themselves.

The condition of science at the present day is not such that we can account, with certainty, under all circumstances, for the primary cause of the stagnation of molecules; and more especially, as they but seldom exhibit any symptoms sufficiently strong and marked to be noticed by us. We shall therefore pass from the molecules to the smallest organisms recognized by us, — the cells. Any disconnection, dislocation, stagnation, or injury to one or to several cells, constitutes, then, so far as our present purpose is concerned, the primary cause of disorder. But we distinguish between fixed and movable cells, the first being less exposed to injury than the last; hence the movable, or blood-cells, are, for us, the most important subjects for observation.

When and wherever the free circulation of the blood, in any part of the body, is interrupted for a certain length of time, coagulation and obstruction, as well as enlargement of the vessel in question, in part or in whole, must, of necessity, take place. And whether this may happen to refer to an artery, vein, lymphatic, or capillary-vessel, the principle is the same, though the appearance and the names of such conditions vary according to the parts affected. The cause for such interruption of circulation may have its origin in the vessel itself, or in the blood — mechanically or chemically — or through the nerves governing the vessel, or it may be caused by external injury, or by too much or too little pressure upon the vessel. The consequences arising from such an occurrence, will vary materially according to the size and strength of the vessel, to the more or less resisting power of the tissues around them, to the state or condition of the resisting power of the body in general, and to the extent of the force with which such obstructions may generally have to meet. This process was known by certain symptoms long before it was understood, and was called *inflammation;* a definition which to-day has no especial or definite meaning. In order to make it impossible to be misunderstood, and at the same time to show how independent science is of mere names, we shall not use the old phrases, but

describe the condition, and then attach the old name, instead of making the name first, and afterwards fit the thing to the name, as has been the usual custom, not only in medicine, but in all departments of thought.

We have learned that the blood from the right heart must pass through the lungs to reach the left heart; the quantity of blood thrown into the lung must, therefore, stand in exact proportion to the capacity of the lung to admit of its passing through, or otherwise the machinery must get out of order. Everybody knows that the heart does not beat the same at all times; but that anything in the way of excitement, or of unusual exercise, sets it to work faster and faster, and that under such circumstances, one is obliged to breathe deeper and quicker. That there must be an intimate relation between the beating of the heart and the respiration, is thus most easily and clearly demonstrated. Nature has given to us three times as much lung as is required for use under ordinary circumstances, in order to meet the exigency arising from the extraordinary amount of blood which, under certain conditions, is pumped into it by the heart; and if this superabundance of lung was at all times ready for use, it would be almost impossible to injure this organ. But this is not the case with very many; take, for example, the clerk who is confined to his desk, or the fashionable young lady, who, through the whole summer long, never brings into full exercise the whole body. Winter comes, and with it the usual gayeties, amusements, etc., of the season. The ball-room is frequented, and the whole night, or a large part of it, is spent in dancing. A single dance cannot be missed, although already fatigued and out of breath; and consequently the pulse is raised from eighty or ninety to one hundred and forty, with full beats. The next morning a very slight soreness is felt in one part of the chest, but not enough to be minded. One or more capillary blood-vessels have been ruptured in one of the small lobuli, and a little (perhaps a teaspoonful) of blood has escaped into the elastic tissue, that is all! There is no symptom other than the very slight soreness, which is gone in a few days. Another ball, etc., is attended, and a few days afterwards what is termed a slight cold is experienced, — caused by an east wind or the damp ground! Some soothing medicine is taken, in connection with quiet rest for a few days, and the cold is gone; — though not entirely. And so the winter is passed; the health is good, only there is a greater susceptibility of taking cold; and hence the cold is more frequent, and each time a little worse; — still nothing alarming, the doctor says. The next summer the Springs or White Mountains are visited, with a view of cure from the change. The hops, parties, and rides are all enjoyed, and home is finally reached, with the belief that health is fully restored. But somehow another cold is taken, and the climate is changed to avoid this or that wind. From the general appearance, feelings, or appetite, there is not much to indicate any serious difficulty, although, it is true, there is occasionally a little cough. Sometimes there is a somewhat severe pain in the chest; but it yields to a plaster, or to croton oil. But all at once a bad-looking phlegm

is raised, alarm and anxiety is felt, and a competent physician called to examine the lungs, who pronounces the difficulty *Chronic Pneumonia*. The little blood which had escaped from the capillary vessels into the elastic tissue two years previous, had remained there all the time, and come up as pus, after having penetrated the alveoles, and poisoned the surrounding healthy tissue.

Thus one of the worst kinds of Consumption is developed. Take another example, by way of illustration. We observe a young man or woman who never goes to dances, but engages in study or business with intense interest and close application. The school-day or college-life is closed with graduating honors, and a position sought for in the world. From early morn to eve the chosen profession or calling is pursued with ambitious and tireless energy. The day's labor or engagements finished, the evening is spent in reading books of interest and profit. As a steady and good son or daughter, great care is taken in reference to the health. Wet or damp feet are always avoided by proper caution, the closing of the windows to avoid a draft is never neglected, and nothing is overdone either in living or in pleasure. The character stands very high in the community, and the good-will of all is secured; but the remark may be occasionally heard, that it is too bad that the countenance should look even a little pale. There is nothing specially indicating that the health is not good, — only sometimes a little flush of heat is experienced, and in the absence of which a slight chilliness is almost always felt, and consequently perspiration very seldom, if ever, takes place. There is not too much flesh, but too little; and the collar-bones are rather prominent, or stand somewhat too much out. There is not much vigor or strength, to be sure, but so far as the feelings are concerned, there is nothing to indicate that there is anything wrong. A cold is caught some day, without any known reason for it, and is followed by a dry, hacking cough, which, however, is slight. Some medicine is taken, and the cough disappears, but comes on again in the spring with increased severity. Cessation from business and a journey is recommended by the attending physician, as most likely to prove beneficial. The advice is followed, and the health apparently wholly restored. But a year or so after, another cold, a little worse than the first, is taken, and some day a small streak of blood is observed in the phlegm which has been raised. Anxiety and alarm are experienced, and a most thorough examination of the lungs is at once submitted to, which results in the assurance that there are *tubercles* in the points of them.

In the one case, the lungs were injured by having too much blood thrown into them under certain conditions, while in the other, they were injured by having too little thrown into them. By steady confinement without proper and sufficient relaxation, and recreative enjoyment, the upper points of the lungs were allowed gradually to collapse. In ordinary life the upper points of the lungs are but seldom used, and therefore the exchange of gases through the alveoles is not effected. Nature, however, has provided that the carbonic acid gas, when accumulated in the alveoles, shall irritate the respira-

tory nerves, and produce an occasional deep inspiration, a deep-drawn sigh, which is nature's preventive against tubercle formations. Still the continued inactivity gradually lessens the irritation, as well as the amount of the gas in the alveoles, until permanent collapse takes place; the immediate consequence being, that the blood moves slower and slower in those parts, and the more so, as but a small quantity is thrown there under any circumstances.

As a result of insufficient exercise, air, and sunlight, there is an increased proportion of white blood-globules to the red ones; and as these white ones, as has been shown, move on the walls of the vessel, and slower than the red ones, an obstruction, or stoppage in the capillary vessels of the neglected part, will consequently occur in a given time. And under such conditions, the capillary vessels will gradually become enlarged at the point of obstruction, and by final rupture permit the escape of blood-globules into the meshes of the tissue where they remain.* And since this process is very gradual, and the pressure of the blood in the vessel proportionably a very small one, the amount of escaped blood is very small, filling only one, or a few meshes of the elastic tissue. This is the primary or real tubercle, the formation of which occurs ONLY in the *points* of the *lungs, and for anatomical reasons* (no part of the body being exposed to loss of pressure so directly as the points of the lungs), *nowhere else in the body*. When blood-globules escape into the tissues in which the normal pressure remains, they may be reabsorbed, provided the pressure upon them is strong enough; in which case the liquid is pressed out of them, leaving their hulls with a portion of the pigment, which can afterwards be found on such places. But in the lungs thus affected, the necessary pressure being lost, no reabsorption can take place. The red globules which have escaped, first lose their color and become whitish, while its solid elements coagulate. They are then observed to be grayish, having different shaped bodies, granules, in them. This is the gray tubercle. Under favorable circumstances these cells change into fat cells, and then show nothing but a yellow contents, without granules. The

*In 1857, when the writer was engaged in finding the ending of the filum terminale in animals, and in man, under the direction of the celebrated neurologist Stilling, in Cassel, Germany, the escape of the blood-globules into the tissues (now known as Cohnheim's discovery) was observed. In 1860, in a private lecture at Meionaon Hall, before the physicians of Boston, the fact of such escape was demonstrated in its application to the formation of real tubercle, but without being understood. In 1863, when the cellular theory was yet unknown in Boston, the same facts were again demonstrated before the Suffolk District Medical Society of Boston, but with no better results, the views advanced being duly laughed at, and by an unknown "FRIEND," in *The Boston Medical and Surgical Journal*, who, conjointly with its editors, not only treated it with absolute contempt, but demanded the *expulsion* of the writer from this remarkable society, which, from the history of former times, is doubtless the proper treatment for any medical man who has the audacity to advance opinions, the results of long and hard labor, and of original discoveries, which are in advance of those held by his colleagues, with a view to improve and extend the knowledge of the profession. The view which has been advanced by Cohnheim, of the escape of the blood-globules through the meshes, or stomata, the writer entirely disclaims, maintaining that they can escape *only by the rupture* of the capillary-vessels; the application of which fact in tubercle formations was first made by himself. (See *New York Medical Record* of Sept. 1st, 1868.)

most favorable metamorphosis is their drying up, and becoming saturated with lime, forming them into a petrified mass. This is the calcified tubercle, a form from which no future danger can arise, and which we call a healed or arrested tubercle. If, on the other hand, circumstances are unfavorable, the gray cells decay by putrefaction, and not only become totally destroyed, but infect their neighboring tissue cells, and irritate them to new growth of imperfect cells, which decay as they develop, until the mother cell itself perishes. Such a process, carried on in any part of the body, becomes very dangerous; for as soon as these putrified masses reach a yet healthy blood-vessel, they coagulate, obstruct, and poison the blood in said vessel, by penetrating it. Small pieces of clotted blood, or diseased cells, are carried along with the blood-stream, and get caught in some other part of the body, when the same process of blood poisoning is repeated; and other pieces again are loosened, and so on until the blood is loaded with these poisoned, perished elements; — obstruction occurs everywhere, and the organism soon perishes. This process is called *Acute miliary Tuberculosis* (galloping Consumption). It has nothing in common with the primary tubercle, — can never originate spontaneously, — may follow the most widely different diseases, but can only occur when a process of mortification, as a previous condition, was going on in some part of the body. It can, however, be artificially produced by inoculation, as shown by Villemin and other experimenters, by inoculating animals with the most widely different kinds of matter. But by the experiments of Waldenburg in Berlin, it has been proved that even these miliary tubercles are capable of being healed, and especially was this the case in such animals as lived upon lime-containing food (goats and horses), while those which lived upon non-lime-containing food, invariably perished (rabbits and guinea-pigs).

Having given a bird's-eye view of a few processes of lung disease, we proceed to classify, anatomically, the various conditions which may occur in the lungs, and shall afterwards give the special pathology of each class.

With this object in view we have to consider the condition of —

1. The Bronchi.
2. The Alveoles.
3. The Blood-vessels and their circulation.
4. The interstitial tissue (elastic tissue).
5. The nerves of the lungs.

A. — Bronchi.

1. Through an accidental or other cause, a congestion (overfilling) of the nourishing vessels of the bronchi may occur, which occasions an abnormal cell formation in the mucous glands; the direct consequence of which is, a swelling of the mucous membrane. These superfluous cells thus formed finally die, and are expelled. They may, however, according to their more or less degeneration, destroy the ciliæ, or hair epithelium of the bronchi; — or cause obstructions of them; — soften their cartilage; — thus enlarge the bron-

chus; infect the cartilaginous cells, destroy them, and thus the whole bronchus (*Bronchitis; Bronchoectasis*, often mistaken for gangrene).

2. From excessive pressure, an enlargement may occur of the nutritive vessels of the bronchi, with stoppage of circulation, and with subsequent fibrinous, polypus-like exudation, with concretions (*croup, rheumatic or hæmorrhoidal metastasis*, a frequent cause of *hæmoptysis*).

3. Nervous spasms of bronchi may occur, occasioned by an undue irritation, either of the vagus or sympathetic nerve (*asthma, asphyxia, etc*).

B. — Alveoles.

1. The Alveoles may never have been extended by air, from birth (*Innate Atelectasis*). This constitutes that condition which has been defined as inherited Consumption. Or they may have collapsed, through neglect or by disease. But both conditions form the basis for subsequent real tuberculosis.

2. The Alveoles may become ruptured, and their wall destroyed.

3. Or they may have been over-extended, so that their power of contraction has been lost (Emphyzema).

C. — Blood-vessels.

a. — Capillaries.

1. The hair capillary-vessels may become over-extended, so as to lose their power of contraction, the result of which would be an excess of blood-water in the lung-tissue (Oedoema).

2. They may become ruptured, and thus permit the escape of blood-cells and fibrin into the tissue, or break through the alveolar walls. This constitutes one of the most frequent and dangerous occurrences in the lungs; the more so, as it is apt to be overlooked, if it comprises only one or two small lobuli. According to the manner in which the blood escapes, and its quantity, we should have hemorrhage, or actual acute pneumonia, the filling up of the lung-tissue and alveoles, which process is subdivided into lobar, lobular, fibrinous, serous, croupous, catarrhic, etc., etc., pneumonia, according to circumstances and complications.

3. Partial enlargement of the capillaries, arising from the absence of external pressure upon them occasioned by the collapse of alveoles constitutes the basis for tubercle formation, and can only occur where respiration in a group of alveoles is totally suppressed (varicosity of capillary vessels).

4. Obstructions of capillaries by foreign bodies, or by dead and morbid cells, the consequence of some morbid process of decay in the body, constitutes what is known as acute miliary tuberculosis, galloping phthisis, often mistaken for typhus.

b.— Arteries, Veins, and Lymphatics.

The larger vessels in the lungs are subject to the same disorders as those in other parts of the body. The walls of these vessels con-

sist of three layers, an internal one, a middle one or muscle layer, and an external one. One of these layers may become congested, and one or several cells degenerated, and this is called inflammation of a vessel. Their walls may finally become dilated on a single spot, or entirely around them (*aneurisms*, *varices*); or their walls may become thickened by deposits into them. The vessels may become ruptured, or be preyed upon by putrid pus, or the cells of their walls may form an outgrowth, thus causing an obstruction, or the vessels may become obstructed by foreign bodies in the blood itself. But since these affections are the same everywhere in the body, and occur less frequently in the lungs than in other parts, we shall give but little attention to this subject here.

D. Interstitial Tissue of Lung.

The cells forming the elastic fibres but very seldom undergo an active degeneration, but suffer, for the most part, through secondary infection; and consequently cancer, fibroid tumors, etc., are exceedingly rare occurrences in the lungs. More frequently we meet with an abscess, the formation of which is sometimes due to a partial new formation from the tissue cells themselves. Abscesses of the lungs are very difficult of diagnosis, and constitute a serious form of Consumption. The meshes of the tissue suffer mostly from rupture, or from over-extension, followed by loss of contractile power and subsequent use.

E. Nerves of Lungs (*Vagus and Sympathetic*).

The very great importance of the nervous system, and its vast influence upon cellular life and nutrition, has never been sufficiently appreciated. Recent discoveries, however, especially those of the celebrated physiologist, Brown Sequard, have shown that this subject bears in a most extraordinary manner upon life generally, and in an uncommon degree upon the lungs. He has found, and demonstrated, by actual experiment, that a comparatively small injury to certain parts of the brain (*Medulla oblongata* and *Pons Varoli*), produce an immediate hemorrhage in the lungs, as well as other disorders. The recent discovery of the so-called abnormal and morbid arrest of nervous power will, undoubtedly, greatly change the views which have formerly been held.

The different pathological changes which occur, may be divided into —

1. Abnormal irritation from the periphery of the body upon the nerves and brain, with its proportionable results of accelerating activity of the heart, blood-vessels, bronchi, alveoles, and tissues.

2. Actual diseases of, or injuries to the brain and nerves themselves; which may be temporary or permanent, and which would produce that condition generally termed paralysis.

3. Changes in the action of the cells of the gray mass, produced either by chemical influence, or by reflex irritation; resulting in spasmodic contraction of blood-vessels, bronchi, and even of the tissues; with rupture or paralysis of them, with total or partially

arrested respiration, a partial or general arrest of normal nutrition, and temporary or permanent arrest of cellular life.

Sometimes the most peculiar injuries, seemingly slight, will be the occasion of the most intense nervous derangement; while at other times, even large tumors in the brain, or pressing upon nerves, will produce but a comparatively slight effect. Such conditions as have been called asthma, asphyxia, spasm of bronchi, spasm of heart, syncope, etc., have their origin in the various derangements of the nerves or brain. The nerves play a more or less important part in any kind of injury to the lungs, or to the body in general.

F. Enlargement of the Vessels of the Pleura (*Pleurisy*).

The blood-vessels of the pleural membranes, under certain conditions, and for certain reasons, may become enlarged or obstructed, the consequence being an exudation of blood-water or blood into the pleural cavity; and the effect, a compression of a part, or of the whole of one or both lungs. In some cases reabsorption of this liquid takes place, while in others it does not. Adhesions of the two pleuras also often occur, which, according to circumstances, may or may not give rise to considerable annoyance. Old cases of pleurisy are often mistaken for lung diseases; they are, however, more frequently complicated with them.

Mistaken for lung diseases, and sometimes complicated with them, are —

1. Diseases of the heart, especially nervous affections.

2. Aneurisms of aorta, or venæ cavæ; degeneration of the lymphatic glands of the chest or neck; the thymus gland; affections of diaphragm; diseases of intercostal muscles, ribs, or vertebræ, spinal column, or brain, etc.; of the larynx, glottis, or uvula.

3. Diseases of the blood, especially of poverty in blood-cells, or an excess of white globules, or of fibrin, albumen, etc. — Blood-poisoning.*

4. Sympathetic symptoms from disorders of stomach, liver, kidneys, uterus, hemorrhoids, etc. (*Drunkards' Cough*, *Hysteric Cough*, *etc.*, *etc.*)

Having thus sketched the lesions which may occur in the lungs, and which constitute, in themselves or their complications, what is termed Consumption, we may further distinguish between a primary cause from *within* the body developing outward, and one from *without* the body developing inward. The whole of the disorders described above, come under the first (from *within* the body); while from the latter (from *without* the body), the bronchial tubes only can be affected. We have learned how well provided the lungs are against dust, by its hair-fibres, which begin in the nose, and end in the finest bronchi. Still, a continued inhalation of sharp-edged dust, as steel, or glass, etc., or of poisonous gases, may interfere with, and produce swelling and chronic inflammation of the mucous membrane of the bronchi, and lead to such serious results as are

* See an article by the writer on this subject, in the Journal of the Gynæcological Society of Boston, for Dec., 1869. Vol 1. No 6. Page 356.

stated above. And it cannot be denied, that the constant inhalation of such nauseous gases as sometimes escape from the decaying lungs of patients, may similarly injure the bronchial tubes of the attendants; and hence the idea of the contagiousness of Consumption has probably arisen. It is also possible that serious affections of the nose, or pharyngeal portion, or even of the œsophagus, might, in a long period of time, gradually infect the mucous membrane of the bronchi. Such an occurrence, however, is not the rule in such cases, but rather an exception, and requires a long neglect, and generally bad condition, to produce such an effect.

We have now delineated every possible injury which can occur to the lungs; and we fail to comprehend how that any one with common sense can hold to the inheritability of any of the disorders named. To affirm that a child may be born with ruptured capillaries, or ruptured alveoles or tissue, or with escaped blood-cells, or inflamed bronchi, is simply absurd. That parents with imperfectly formed constitutions, or rather, with cells of little energy and activity, cannot give birth to a child with so active cells as strong and vigorous parents, is self-evident. When a child is born of weakly parents, it often requires prompt and energetic manipulations to make it breathe at all. Such children are very apt *not* to extend several of the alveoles, and thus the foundation is laid for what is termed inherited Consumption. The discovery of this fact, being of very recent date, has never been used by any author. To maintain the inheritability of Consumption, it is absolutely necessary to believe in the existence of some imaginary noxa, the unknown fiend which has led physicians at all times to views which, from an anatomical standpoint, are exceedingly painful to observe; — views which have given to medical knowledge the popular reputation of being nothing but an imaginary classification of words based upon ignorance. There are children, it is true, which are born with inherited diseases; but all such diseases are positively known, and admit of microscopical demonstration. Such children are at no time healthy, and invariably die before attaining puberty. All inherited diseases arise from the direct introduction of diseased cells from the mother's blood, and is the only way in which an inheritance of disease is possible. In Consumption, such condition has, as yet, never been observed, and it has been positively shown by Virchow, that tubercles never exist in the brain of very young children, as was generally supposed, and that the statement of such appearances is found, in correct observation, to have been a mistake.

We have now learned that that which has been called Consumption is not a real existing something which no one can comprehend or know anything about, but rather an almost endless complication of different injuries which may occur to the lungs, as may have been learned, in part, from the classification given. But to comprehend the whole subject we must understand how that these different injuries complicate one with another, it being possible to find all of them together in one and the same body. It is this accumulation and complication of different processes which has made the subject of Consump-

tion so difficult, so incomprehensible, so pernicious, and, thus far, so absolutely incurable. The intense difficulty of comprehending or understanding all these complications in each case as they arise, may be readily conceived; for, notwithstanding the exactness and reliability of the modes of examination employed, it is not possible, in very complicated cases, to ascertain everything. The greatest difficulty arises, where old and new processes occur together in the same lobes. Under such circumstances the very best specialist would be liable to mistake, to say nothing of the general practitioner. A complete and perfect picture or delineation of such a case, is only possible after a sufficient period of observation by comparison, in connection with logical and anatomical reasoning. The simple processes are comparatively easy of detection and explantion, as well as of treatment, while the complicated ones sometimes offer difficulties almost insurmountable. For example, we find in the same lung, one lobulus filled with old degenerated blood, — pus; and in another part of the same lobe, we meet with a process of escape of fresh blood, — acute pneumonia. The treatment for the first requires expulsion of the pus by expectoration, — a forced treatment; the latter requires absolute rest in bed, for the reabsorption of the fresh blood escaped. What for the one case is good, is the very opposite, or bad, for the other. In addition, do we have to deal with pleurisy at the same time, or with bronchitis as a complication? If so, it can be easily imagined that it becomes a matter of very great difficulty to prescribe the correct treatment in such cases.

Before concluding this outline of the general pathology of lung diseases, we would remark, that although we have given a general view of all possible injuries that can happen to the lungs, under any and all circumstances, it is not possible to give a special pathology that would be exactly correct for all cases; nor even of a single case, that would be absolutely correct for any other single or particular case. It is certain that there has not been two cases of so-called Consumption precisely alike, since the disease was first known. Different cases, it is true, may *appear* to be alike, and so do various games of chess, which, however, differ very widely; each game being played, by the skilful player, as circumstances may require, so as best to meet his antagonist. So each case of lung disease requires to be treated independently, according to its own peculiar complications, indications, and developments. It is one of the greatest mistakes of physicians, as well as of laymen, to fit cases into some one they may have seen before, or in other words, of making the pathology and treatment of one case stand for other cases which *appear* like it. As no naturalist has ever seen two men, animals, or even blades of grass, every way alike, and as no general has ever fought, or even witnessed, two battles, which in every respect were the same, so no physician has ever seen, or can see, two cases of any kind of disease every way alike. Every single case of disorder of the lungs, or of any other part of the body, should therefore be studied in itself, treated accordingly, and recorded as a single case only, and not with a view of making it stand for others.

The physician who has always a certain remedy for Consumption, is playing the part of a charlatan and humbug; while the patient who asks for his remedy, to say the least, is not overstocked with wisdom. From this standpoint we shall endeavor to specify certain processes of disorder, as special subjects, with their treatment, but we object to being understood as giving a pattern that would fit any case. A physician is no more than a general. He has his army drilled and ready for immediate use; — but he could not say what he should do in the next hour, nor what command he should give — but the good general is almost sure to give the right word at the right moment. The bad general, and stupid physician, by determining the entire course of procedure, before they know what, or where, the enemy is, are sure to lose, whenever the enemy takes a course different from their calculations. While we deny the existence of any such disease as Consumption, as such, we positively deny, and object most strongly and absolutely, to any special medicine, or mode of treatment against it. Still we hope to show that any injury of the lung can be better and more satisfactorily managed than has thus far been anticipated by any one. All we require is the exact understanding of the anatomy in question, and the logic of common sense.

On the Methods of Examining Lungs.

TO a person of experience, observation, and practised eye, it would not be difficult to select, even from the multitudes as they throng the streets, those who suffer severely from chronic lung diseases. In such cases the head hangs forward, the scapulæ or shoulder-blades stand apart and outward like a pair of wings, the front of the chest is sunk, downward and inward, and the whole frame presents to the mind a complete and perfect picture of premature decline.

But as easy as it is to discover a severe lung affection, it is just as difficult, on the other hand, to discover the same thing in its incipient stages. And just here lies the great object of the specialist, it being comparatively easy to correct all lung difficulties in their earliest stages, while those which exhibit the symptoms above mentioned have passed beyond the reach of curative processes, and therefore in such cases there is no need for a physician except to relieve urgent and troublesome symptoms, and to save from a painful and tortuous death by suffocation. To discover and to trace the various possible injuries of the lungs, we employ the organ of hearing, the ear. We have previously learned that the mode of examining the lungs known as *percussion of the chest*, was first discovered by Auenbrugger. Physicians, as usual, however, paid no attention to it, until brought into notice by Corvisart. This discovery consists in ascertaining by a quick stroke upon a fixed body on the chest, its resonance, or rather its sonority, and thereby determining the condition of lung as to *its containing air, or its solidity*. If in the former condition, the sound produced is hollow, like that from an empty barrel; if in the latter, it is like that produced from the thigh or solid muscle of a fleshy person. For this purpose physicians use a little flat circular body called a plessimeter, made of hard rubber or ivory, and a hammer, on the end of which is a piece of soft rubber, to lessen the noise of the stroke upon the plessimeter. An experienced examiner, however, always uses the forefinger of his left hand as a plessimeter, and the middle finger of his right hand as a hammer. The human finger lies more exactly upon, and fits better between the ribs than any artificial plessimeter, and the stroke of one finger upon the other not only gives a purer, but by far a more exact and reliable note than the hammer.

The proper and efficient use of the fingers for this purpose is, however, difficult, and for many physicians absolutely impossible, and hence the very general use of the hammer and plessimeter. The notes or tones given out from the cavities of the body, are not alike in any part. The most hollow notes should come from under the clavicles or collar-bones of the chest, and from under the scapulæ or shoulder-blades upon the back, and the dullest notes should be given out when struck upon the liver. The least induration, or escape of liquid into the lung tissue, changes the tone, and thus we are enabled

to ascertain with absolute certainty whether or not the lungs have become infiltrated. It, however, requires a very acute ear, and great experience, to distinguish the small lesions, as every one knows who has practised the art of percussion. The less the exudation in any given case, the more slight, of course, will be the comparative difference of the note given out from that of perfect health, and hence not only the difficulty of distinguishing it, but also the vast and increased importance of its early detection with a view to cure.

The next most important discovery in this direction was made by Lænnec, and is called *Auscultation of the Chest*. This consists in simply putting the ear closely upon the naked chest, and listening to the noise which the air produces by inspiration and expiration. The hair fibres of the bronchial epithelium, as previously stated, all move, and with their ends standing or pointing towards the mouth, consequently the air strikes against and passes through these fine hairs, thereby making a noise somewhat like, or resembling that of a light breeze as it strikes against and passes through a corn-field; while in expiration the air passes out in the same direction with, and over the hair fibres, and consequently does not make any noise whatever during health. But when there is the least injury or exudation of blood-globules into the tissues, the action of the hair fibres is lessened, and the air under such conditions becomes audible in expiration. A description of the different *noises*, from the almost inaudible, to the loud and rattling that can be heard in every part of the room, cannot be given, but must be heard, and by experience and comparison learned, to be understood. The difference in acuteness in the sense of hearing of different persons is well known. One person can distinguish the variation of a sixty-fourth of a diatonic, or rythmical note, while another is not capable of distinguishing the variations of half a note, and this is as true of physicians as of others; and hence the art of auscultation is very easy for one, while for another it is simply impossible, although the learning of both may be equal. It is just as difficult and impossible for some physicians to learn to examine the chest correctly, as it is for others to learn to operate elegantly in surgery. With a view to lessen the difficulty in question, instruments were invented called stethoscopes. They consist of a wooden tube, or of a complication of wood, brass, india-rubber, etc., and are constructed for one or for both ears. It is, however, well known that a sound or noise cannot be made louder or stronger by distance, but, on the contrary, that its volume is lessened by each inch of space through which it passes. Therefore it is not difficult to comprehend that the use of the stethoscope is not only useless as a means of examining the lungs, but that in reality it mostly serves to impress the patient with the idea that the respective physician who makes the examination understands what he is about. A stethoscope is only useful for the auscultation of the heart; for by lengthening the distance through which the sound must pass to reach the ear, the noise produced by respiration is lessened, and consequently not so distinctly heard, while the beat of the heart, for this reason, becomes more distinctly audible. No physician who really comprehends

what he hears, and what there is to hear, will ever use a stethoscope for examining the lungs, except in cases where the untidiness of the patient makes it necessary. And the simple fact may be here stated, that the *less* a physician understands what he hears, or what there is to hear, the longer will be his instrument. The double stethoscope, as used in this country, is almost two feet long, and if placed on both ears, with the vacant face and empty head of some self-complacent and dignified looking nobody appearing in the middle, we are forcibly reminded of a picture, to mention which might be regarded as unpardonable.

There are several other but less important modes of ascertaining lung difficulties, one of which is, by means of the vibrations of the chest while speaking. The more solid the lung is, the stronger will be the vibrations. Another method employed, is the aspect of the frame of the chest. The thermometer, and the variations in the beatings of the pulse, are two important means of confirming certain pathological conditions; but percussion and auscultation are the two modes which rank first of all others. An instrument called a spirometer is often used for examining lungs, the purpose of which is to measure the amount of air contained in the chest. For the diagnosis of diseases of the lungs, this instrument is absolutely worthless, the amount of air in the lungs of any two persons never being the same. It will be found to vary as much as the strength of their muscles, although they may look equally strong. Charlatans are the only parties who use this instrument upon their victims. A person who fully understands how to examine the lungs, and comprehends the conditions indicated by the various sounds to which he has listened, in making an examination, is able immediately to draw upon paper the pathological condition of them, or otherwise he is incompetent. But a diagnosis can never be complete from the lungs alone, the condition of the rest of the body being essential, to finish the picture. The condition of the abdominal glands, and of the nervous system, in any case, are as important as the condition of the lungs. To ascertain the first, percussion of the abdomen and the chemical, or spectral analysis of the excreta, are employed. To ascertain the latter, the history and circumstances of the patient, in connection with observation on the part of the physician, are the only means by which a correct final conclusion is possible.

The absolute necessity of a correct diagnosis in treating disease is not sufficiently understood by the public, and therefore is not regarded as of sufficient importance, on the part of their respective physicians in general, to make themselves masters of it. But any physician who undertakes to treat, or to prescribe anything for a patient, without a *complete* diagnosis, is, to say the least, doing the same thing, and acting on the same principle, as the most contemptible quack. It should be the fixed purpose of every patient, not to allow any physician whatever to prescribe for him, unless he is abundantly able to satisfy him by clear and comprehensive explanations in reference to the difficulty from which he is suffering. There exists no pathological condition in man, in animals, in the air,

or anywhere in the universe, which is incomprehensible, or which requires the least secrecy. Whatever is unknown to science is unknown, and does not require to be covered by the dignity of ignorance.

Disorders of Bronchi.

THE lungs of a child, previous to its first act of breathing, are in a state of complete density, and have the appearance of being solid, instead of spongy. But, with the first act of respiration, they become filled with air, and expand like a balloon. And it should naturally take but a few minutes for the air to enter any one or all of the alveoles, or air-cells. This filling of the alveoles with air, and their consequent extension, is principally effected by means of crying. The child, by this act, closes the vocal chords in such manner as almost completely to prevent the escape of air, and thus forces it into all parts of the lungs, and hence its importance can hardly be overestimated. In fact, it is absolutely essential that a child should cry loud and often. This, however, should be understood in a common-sense way; for, if a child should cry *too* much, it would, by so doing, prevent the closing of the foramen ovale (a fissure between the two auricles of the heart, through which the blood passes during the embryonic state), and bring about the condition and symptoms called cyanosis (blue baby). Any well-developed child will naturally extend the lungs, in the manner indicated, of its own accord; but in our times of mental and physical weakness and fashionable folly, children are born that have not enough of cellular energy properly to perform their first attempt of eloquence. Nor does the mischief end here; for, in this country, the folly is sometimes carried so far as to prevent the crying of the child by giving soothing syrups and opiates, or alcohol, in some one of its many forms. As already indicated, there can be nothing of greater importance than a full and complete extension of the lungs, as otherwise the child will be unhealthy and sickly during its whole life. The walls of the neglected or non-extended alveoles after a short time adhere, and become entirely lost for future use, unless opened either by accident or art; which, in time, becomes more and more improbable. The discovery of the non-extension of the alveoles in young children is of a somewhat recent date, and is scientifically called *atelectasis*. It may occur in a whole lobe, or only in a lobulus, or it may be confined even to a single group of four or six alveoles. According to the magnitude of the defective extension of the alveoles, the characteristic symptoms are sooner or later manifested. If a whole lobe is thus neglected, a physician can be of no use whatever; for the child will invariably perish under symptoms of congestive cough, as in acute pneumonia, and with the appearance of more or less of blueness in the face (cyanosis). But if a lobulus only is affected, no such alarming symptoms as above indicated will ever appear. The space occupied by a lobulus is so small, and its use comparatively so little missed, that a child thus affected *appears* perfectly well and healthy. A defect of this kind can only be detected by careful examination and close watching on

the part of a competent physician. A child affected in this way will grow up very much the same as other children not affected, with the exception of a peculiar tendency to "taking cold," and of something being the matter with it every now and then. The teething gives trouble; the milk is not digested; the child appears nervous; finally, whooping-cough appears, — the symptoms of which are too well known to require description. But according to the popular idea, it should run its own course, and continue about twenty weeks. Notwithstanding the remarkably fine and exact observations of Niemeyer and others upon the general characteristics of this disorder, the peculiar spasms of the cough, in connection with the appearance of perfect health during the intervals, have thus far been a complete mystery. We are convinced that whooping-cough, in a majority of cases, at least, is caused by atelectasis; it being simply a last effort of nature to extend the neglected alveoles of the lungs, by using the utmost violence in her power. The fine bronchi which lead from the collapsed alveoles, for obvious reasons, are also necessarily in a state of collapse. The mucous glands, however, must begin to secrete that thin mucus which keeps the bronchi moist. But this secretion, not being expectorated or evaporated, accumulates, becomes degenerated, and causes irritation and consequent swelling of the bronchial glands and membrane. This inflammation is communicated to the neighboring healthy bronchi, which, in like manner, become affected, and prevents the free access of air to their alveoles. As soon as the oxygen in these alveoles is all used, the accumulated carbonic acid gas irritates the pneumo-gastric nerve, according to a law of physiology, and causes a tickling sensation in the throat, which makes the child cough. And the child will be obliged to continue coughing until the air is forced through the bronchi, thereby relieving the alveoles for a length of time, or until there is a similar accumulation of carbonic acid, when another fit of coughing must, of necessity, take place. During the intervals between the paroxysms of coughing, the child does not appear to have trouble of any kind, more than a person in health. Niemeyer states a most peculiar notion and significant fact in connection with an aristocratic lady, of Germany, who remarked that she had successfully cut short the spasms by whipping the child if it did not stop coughing. Niemeyer thinks that a child will cough more than is actually necessary; but, as we shall show, coughing and crying relieve the confined alveoles in the same way. The act of coughing is accomplished by a quick, spasmodic contraction of the diaphragm, contraction of the thorax, and the closing of the larynx by the vocal chords. The act of crying is performed by a slower contraction of the diaphragm, contraction of the thorax, and an almost total closing of the larynx by the vocal chords. Therefore, in both cases, there is necessarily a forced compression of the air in the chest, which, by mechanical action upon the swelled bronchi, releases the confined air of the alveoles, and thus gives relief. Whooping-cough is, therefore, caused by the swelled and inflamed condition of the finest capillary bronchi; the spasms occasioned by

the irritation of the confined carbonic acid in the alveoles, and the intervals of freedom from every symptom of disease, procured by the escape of the carbonic acid, and the entering of fresh oxygen.

We are inclined to the belief that a sudden fright, occasioned, for example, by a smart slap upon the child, would cause the above quick contraction of the diaphragm, and have the desired immediate effect of cutting short the spasm; but in no way would we be understood as regarding the whipping of a child a remedy for any kind of disorder.

The latest researches of Brown-Sequard on the influence of the nervous system upon respiration, are highly interesting and important as bearing upon this subject. In connection with Niemeyer's statement of whipping a child to stop the cough, he remarked, that the *will* was not only powerful enough to suppress a cough, but that even the tickling of the nostrils or the ear would very often immediately relieve a spasm. This fact he explained, not as the result of a simple reflex action, but maintains that such a different irritation upon another portion of nerves is capable of changing the physical and chemical condition of the cells of the gray mass, and thereby cause a different action of the brain. These highly-important matters have never been practically applied; — we shall return to this subject again farther on. Physicians being unacquainted with the mechanical facts about the above-indicated spasms, have not been able to find an effective remedy against them. A spasmodic cough may also have its origin in disorders of the heart, or of the brain, or it may be occasioned, even, by worms in the intestines; and hence that no specific treatment can be given, must be self-evident. The extract of belladona and morphine — which have been used throughout the past — act as a paralyzing agent upon the nerves, but in no way relieve the difficulty, and are apt seriously to injure the brain and the digestion of the patient. The proper remedy is to relieve the alveoles by fresh air. To accomplish this, the child, if old enough to comprehend the object, can be taught, by loud crying or artificial coughing at regular intervals, to compress the air in the chest, and thus avoid the exhausting and often frightful spasm of cough. But when the child is of such tender age as to be unable to comprehend the object or to perform the necessary acts, as indicated, the physician can do nothing more than to regulate absolutely the digestion. Any medicine whatever, beyond this purpose, is either foolish or quackish. And in this fact may be found both the reason and the justness of the claim of the Homœopathists, that their treatment in whooping-cough is productive of greater and better results than that of the so-called Allopaths. When nothing is the remedy, nothing *must* be productive of the best results.

No child with whooping-cough should ever be exposed to cold, or to too dry an atmosphere; but should be kept in an equally-warmed, yet properly-ventilated room. If this is strictly attended to, and the digestion of the patient regulated, whooping-cough should be invariably cured in from two to four weeks, except in cases of complication with other disorders. From the fact that children are apt to

cough into each other's faces, it is not advisable to bring healthy children into careless contact with sick ones. Admitting the possibility of injury by the sputum, by direct communication by coughing in the face, we positively deny any other kind of contagion in whooping-cough.

If the whooping-cough is arrested by correct treatment, the neglected alveoles may thereby become extended; but if otherwise, the child will be liable to future injuries, all of which have hitherto been explained as inherited Consumption (*Vulnerability of Virchow and Niemeyer*).

The Coughing and Raising of Blood is not an uncommon occurrence, and, until recently, was considered by physicians as a very dangerous symptom, it being regarded as a sure indication of lung disease. This, however, was a great error, as, in most cases, these bleedings have little or nothing to do with the lungs. In eight out of every ten cases, the blood comes from the trachea, or large bronchi, and not unfrequently from the posterior part of the nose. In such cases, there is nothing more serious than in nose-bleeding; which, however, under certain conditions, may arrive at a point of considerable danger. When the bleeding is from the bronchi, the lower down its source, the more serious it becomes. It is not difficult for an experienced physician, from the appearance and color of the blood, to tell very nearly from whence it comes. Very bright-colored blood almost always comes from the bronchial vessels, and the lower down it originates the more it will be mixed with the mucus. When blood comes from the lung-tissue, it is always very dark, and comes up pure, and generally in profusion. But bleeding very seldom originates from the vessels of the lung-tissue, it being generally occasioned by external injury, more seldom by internal degeneration. Although the raising of blood is very rarely a dangerous occurrence, it is always advisable to consult a physician in regard to it; especially for the purpose of ascertaining its cause and nature. For, though the bleeding itself may be of no consequence, it sometimes occurs as a symptom of a dangerous disorder, which may, perhaps, be easily removed, or clotted blood may remain in the bronchi, obstruct, and become a secondary cause of injury to them.

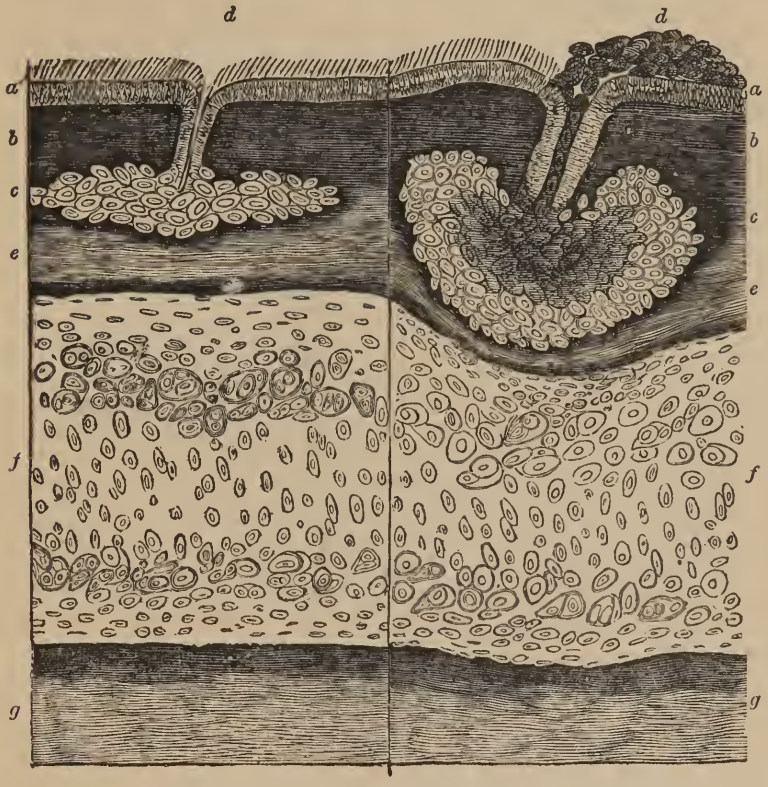
Patients, in general, become alarmed at sight of their own blood; and therefore we would here impress upon all who may happen to be present on any occasion, when blood is raised by any one, the importance of calm and cool self-possession. Every one should bear in mind, that a really dangerous lung-bleeding almost always carries off the patient very quickly; but that in most cases there is no immediate danger whatever, and that a fright under the circumstances will injure the patient more than the loss of blood sustained. In all such cases those in attendance should keep perfectly calm, and endeavor, by some little playfulness or pleasantry, to enliven and cheer the patient, who, in the mean time, should be placed in a half-recumbent position, and required not to increase the difficulty by

hacking or coughing, or by any effort to raise. With the exception of a little salt, or a small amount of vinegar, these being generally credited popular remedies, and which can do no harm, and may assist in quieting the patient, no attempt should be made by an unprofessional person to arrest the bleeding. In most cases nothing of a medicinal character whatever is required. Medicines possessing the necessary properties for the arrest of bleeding, should *never* be employed except in cases of real danger, which fortunately are of rare occurrence. To prescribe strong styptics, as secale cornutum, sugar of lead, large doses of opium, or strong resins, etc., except in cases of real danger, is, to say the least, very bad practice. Every educated physician knows that a blood-vessel very readily contracts of itself; — that a clot artificially produced by the use of styptics, sometimes prevents the contraction of the blood-vessel, and occasions secondary bleeding; and that to cause a coagulation of the blood, especially in the smaller bronchi, can be productive of no benefit, but rather of serious injury, to the patient. In a great many instances, patients have been injured more by their respective physicians than they would have been if left entirely without medical treatment. And here, as everywhere, we advise patients never to take any kind of medicine unless they are satisfied that the medical attendant fully understands the case, and is able and willing to explain its nature and origin. There is no case of bleeding which requires hurry, or blundering haste. If a large vessel is injured from any cause, the patient is beyond the reach of medical aid, and dies ere he is conscious of his own danger; and should a small bronchial artery be partially injured, it would be exceedingly difficult, if not impossible, to control the bleeding; but such an occurrence in the lungs is, however, one of very great improbability. If the patient is subject to bleeding, a very small injury may prove serious, and even fatal; but in ordinary cases, all that is necessary is a little rest and care, and the bleeding will be arrested by the processes of nature, sooner and better than by the use of any kind of medicine. But one of the most dangerous forms of bleeding is wholly internal in its character, giving no appearance of blood to alarm and warn the patient; and will be spoken of under chronic pneumonia.

The Bronchi, as previously shown, are a continued channel or channels, through which the air passes to the alveoles or air-cells of the lungs. Beginning with the trachea, they become smaller and smaller as they branch out from one another, yet show the same character of construction. Very nearly all of the differently appearing disorders of the bronchi have the same beginning, and are mostly distinguished by the larger or smaller size of the bronchi affected, the extent of the disorder, the length of time during which it has existed, and the complications which may have combined with it. The general condition of the body, especially that of the blood, also plays an important part in regard to the matter. It is not our present purpose to enter into the minute variations which may occur,

under all conditions, but to give a thorough explanation of that state called bronchitis, with here and there a hint at common phases and variations.

The accompanying cut is to represent a section of a bronchus in health, and the same in a highly congested and inflamed condition. At *a*, in the first half of the cut, we see the epithelium with the fine hair fibres which are in constant motion, towards the mouth, even some



time after death; *b* is a layer of elastic tissue, which allows the bronchus to contract or extend, and thus adapt itself to the atmospherical influence of heat and cold. At *c*, we observe a mucous gland, consisting of mucous-cells, which produces a thin slimy liquid, which escapes through *d* into the bronchus, and keeps the hair-fibres moist; *e* is a layer of connective tissue—somewhat less elastic than that of *b*, and in which are situated the finest vessels, which nourish the mucous-gland; *f* is the layer of cartilage, which gives the bronchus its strength, and at *g* we have the coating or covering towards the lungs, in which nourishing vessels are also distributed. In connection with the fine nourishing blood-vessels, the intensely fine ramifications of the two nerves of the lungs run.

In the other half of the cut, we observe the same mucous gland at *c*, greatly enlarged, having, as the result of congestion, produced a

great many new cells; but the middle or inner portion of them being cut off from ready nourishment, die, appear cloudy, and are finally expelled through the enlarged mouth of the gland, at *d*, and appear as dim, cloudy cells in the thick and heavy phlegm afterwards expectorated. We also observe how the gland presses upon the connective tissue and cartilage (*e* and *f*) on one side, and upon the elastic tissue and epithelium (*b* and *a*) on the other. If a gland thus congested continues to enlarge, it will be readily seen that a bronchus so affected will be very considerably changed in its appearance. By the swelling of the epithelium the bronchus becomes impassable for air, and consequently it is not only difficult, but sometimes impossible, for the mucus to pass off. By the extension of the cartilage the elastic tissue of the lung becomes compressed, thereby causing a partial or an entire arrest of capillary circulation, resulting in acute pneumonia, or in enlarged and obstructed capillary blood-vessels, with excessive exudation into the tissues. Corresponding with the earlier or later relief afforded relative to the first cause of injury, and to the extent of this process of inflammation, the consequences will be more or less serious. If early relief is afforded, the pressure and obstructions in the blood-vessels diminish, the formation of new cells stops, the dead ones are readily expelled, the over-extended tissue cells contract to normal dimensions, and in a proportionably short time everything is in good working order again. If, on the other hand, the difficulty goes on without due attention, and the obstructed blood circulation not relieved, the swelling and formation of new cells will steadily continue in the periphery, while more and more will die in the centre, until they cannot be readily expelled through the opening of the gland. Decay now ensues; not only the mucous cells, but also the cartilaginous epithelium, connective tissue, alveolar and elastic tissue cells, gradually die. The expectoration of the patient becomes of a fœtid character, but if he is able to expectorate as fast as mortification advances, he may yet recover, provided relief is afforded in due time. But, on the other hand, he will die either of general blood poisoning (acute miliary tubercolosis), or of exhaustion.

This pathological picture will equally apply to any kind of bronchitis, from whatever source it may have originated. The causes, however, which may produce such a result, are immensely variable. We may distinguish three principal causes: 1. *Mechanical injury of the bronchi;* occasioned by inhaled dust, poisonous gases, or matter; abnormal action of the left heart, causing overfilling of the bronchial arteries, and preventing the relative flowing off of the blood by the bronchial veins, which is more or less the case in all extraordinary irritations of the bronchial nerves. 2. *Chemical changes* in the blood, producing excretions into the poorly nourished and lax bronchus, or the blood itself being poor in nourishing material, the bronchus becomes relaxed to such an extent as to lose its power of contractility, and consequent ability to meet readily the emergencies occasioned by sudden changes of atmosphere and temperature, thus giving rise to coagulation, and interference with cir-

culation. 3. *Disorders of the nervous system*, causing abnormal contraction of bronchial blood-vessels, and sometimes direct rupture; contraction of the bronchus itself from the mouth towards the lungs, thereby forcing the air into them, so as to produce emphysema, and even rupture of alveoles. (*Brown-Sequard.*)

Inflamed bronchi is one of the most common complications with other disorders of the lungs, and as such it may become very troublesome, making the treatment, as well as the recovery, very difficult, and sometimes impossible. A common occurrence, even in smaller chronic affections of the bronchi, is the coughing up of little streaks of blood, or, it may be, of one or several teaspoonsful, the result of the rupture of some capillary-vessel in the bronchial mucous membrane, that had become abnormally enlarged. This bleeding is by far less dangerous than the bleeding from the lung-tissue itself, but requires an experienced physician to determine whether it is bronchial or parenchymatical.

The most common and steady symptom of inflamed bronchi, is a rattling in the chest of the patient caused by half-loosened phlegm, thrown back and forward by the vibrations of the air, and which may sometimes be heard all over the room. In some acute cases the pulse is quite high, while in others it is normal. The danger in connection with bronchitis is largely confined to the two extremes of age. For reasons already given, the younger the patient, the greater the danger; on the other hand, it is rarely curable in old age. If, however, bronchitis is without any complication, it is ordinarily the least dangerous of all lung disorders, and yields readily to judicious treatment.

The nature and character of the treatment depends entirely upon the first cause of the disorder. If the bronchitis is the result of inhaled dust, or poisonous inhalations, these causes must be removed, after which, the inhalation of a finely dispersed solution of sea salt by means of an atomizer is all that is required, unless the digestion be badly out of order, or the case one of long neglect. If it is occasioned by disease of the heart, as defectiveness in the valves, it becomes a dangerous, and very often an incurable disorder, since the cure of heart diseases are in most cases impossible. Rest, perfect digestion, living in mountains in the tropics, or in a mild climate by the sea-side, in such cases, is advisable. Bronchitis caused by disorders of the blood and digestion finds its appropriate treatment in the regulation of these difficulties, and cannot be defined for special cases. In younger persons of a so-called lymphatic temperament, especially young ladies suffering from incipient bronchial affection, the use of Seltzer waters with milk, of mineral waters containing iron, with change of residence or climate, etc., is advisable. In cases where there is suspicion of affections of the brain, or uterus, etc., the treatment must be directed to such organs. In some cases, bronchitis is connected with an intense nervous irritability of the respiratory nerves, causing the patient a great deal of trouble. In such cases, and in such cases *only*, the inhalation of narcotic vapors are indicated, not, however, so much as a curative agent, as a temporary

relief. In many cases the first cause of injury cannot be ascertained, and are sometimes very difficult, and require a treatment of the most lenient character.

The general rule for the treatment of any kind of bronchial affection, is to keep the bronchi as clean as possible, and all the air-passages open and free for the passage of air. The air alone washes out the bronchi, and where and whenever a part, or even a single bronchus, becomes obstructed for any considerable time, dangerous complications are sure to follow. In ordinary cases, the slow inhalation of pure, but not too dry, air, and the quick exhalation of it, is quite sufficient; but in old and neglected cases, more powerful remedies are required. In cases of obstinate obstruction of the bronchi by mucus, the inhalation of spirits of turpentine is a most reliable remedy. It causes violent and spasmodic coughing for the time being, but is one of the most effective agents known to the writer. In extreme and obstinate cases connected with cachectical and shattered constitutions, the internal use of arsenic, and sometimes of iodine, etc., must be resorted to. The rule should be, always to employ the mildest and most lenient treatment first, and the stronger and more severe, only after the case has proved one of great obstinacy and resistance. An incipient bronchial affection will rarely resist the influences of a journey to some healthful region, especially to the mountains of the West India Islands, or the plateaus of Mexico. But before a patient undertakes such a journey, he should be sure that he suffers from a bronchial catarrh *only*; for if a cause exists like heart disease, degenerated liver, or other organs, such voyage would not only be a useless expense and loss of time, but might result in absolute failure, while if at home he might be partially or wholly restored. If a long journey is not undertaken, mountainous forests should in most cases be selected as a place of resort, because the air being less dense or thinner in such places on account of the altitude, penetrates into the bronchi much more easily than the denser and less pure atmosphere of large cities and localities elevated but slightly above the level of the sea, and contains a greater amount of ozone.

Such manipulation as the injecting of nitrate of silver into the trachea, is highly irrational; and although cases of recovery are reported, such treatment is extremely dangerous, the more so, as such injections never reach the finer bronchi, but remain in the trachea. For affections of the glottis, larynx, etc., it is different, and of course another thing. Still we maintain as the rule, that the most simple means are the best, and that the powerful ones are only the exception. The unreasonable treatment of physicians who, instead of ascertaining the real cause of difficulty, immediately make caustic applications and prescribe internal remedies, of the effect of which they know as much as about the incomprehensible, has often given to the homœpath the chance to cure with nothing, where the most injury had been previously done by injudicious treatment. Of external applications, warm fomentations are highly effective in children,

especially at the beginning of any trouble, and a properly-applied fomentation is often worth more than anything else.

Neither the cold or the hot bath are advisable in any case. And we especially warn all those who experience the slightest difficulty in blood-spitting, or bronchial trouble, not to use internal remedies that are intended to arrest coughing. The cough is a symptom, not a disease, and is simply the effort of nature to restore and warn the patient. More than half the consumptives of America have brought their trouble upon themselves, by prematurely curing a cough by the use of medicine; and we are sorry to say that a great many practising physicians are guilty of the same "faux pas," from the fact that they know no better. The most severe cough may be simply a reflex symptom, and have at its base no disease whatever of the lungs, while some of the most dangerous lung diseases begin without any cough at all, as we shall learn further on.

Although what is called ASTHMA does not exactly come under the head of Consumption, we shall make a few remarks about it. This affection, though not dangerous to life, is exceedingly troublesome and annoying. In a great many cases, the trouble is the inflammation of the finest bronchi, and the treatment the same as that of bronchitis; but asthma is really only an affection of the nerves of the lungs, especially the vagus, by which the bronchial muscles are spasmodically contracted, and the patient brought into a state of suffocation. This nervous irritation is not unfrequently occasioned by diseases of the spine, or by tumors pressing upon the nerves, or by actual diseases of other parts of the organism, or by some morbid affection of the cells of the gray mass of the brain. In a great many cases the difficulty is incurable, but in others it will disappear the moment the true cause is discovered and removed. A great many remedies and cures are recommended, none of which, however, are reliable. Among them are the following: the inhalation of compressed air, of air with increased oxygen, of chloroform vapors, of narcotic vapors, of tar, fir, etc., and of a great many other things; also the use of ice, coffee, quinine, arsenic, and a thousand other things.

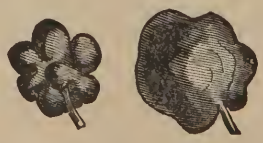
Some of these asthmatic patients are relieved by very trifling things, as the removal of a noise, or person, opening or closing of a window, door, etc., while, with others, nothing will be of any use whatever. Change of climate, or residence, is often accompanied with complete cure. As mental disturbances and a bad conscience are often productive of these affections, it becomes very difficult for a physician to ascertain the cause in such cases. When the cause cannot be ascertained, there is nothing left but to experimentally ascertain by what means the respective party gets relief, and to avoid such disturbances as are likely to cause a paroxysm. A spasmodic contraction of the diaphragm constitutes another form of asthma, which is by far more serious than the above, and is generally caused by a disease of the spine, and incurable.

Disorders of Alveoles.

As previously shown, the alveoles may never have been extended from birth; and, if not, a few months will have been sufficient time for their walls to have adhered together. The most dangerous consequence of such adhesion is, not so much the loss of the alveoles involved, as the lack of pressure, arising from their non-extension, upon their respective blood-vessels, which, at these places, are therefore liable to enlarge, burst, and thus to permit blood to escape into the elastic lung-tissue. Such escaped blood gradually degenerates, and, according to circumstances, produces more or less serious consequences. The only sure preventive against such occurrences is, at the time of birth, to make the newly-born child cry aloud, and often. If its respiration be imperfect, a smart slap upon it may answer; or, still better, the child may be dipped into, or suddenly syringed with, cold water — which may be repeated daily, as the case may require. It is not difficult for a physician, or an experienced nurse, to tell whether the lungs are fully extended or not. The alveoles may, however, collapse during life, and produce the same effect as if they had never been extended. This may result from different causes. It may be the result of a bronchial disorder, by which the air is permanently cut off from the alveoles; it may be occasioned by partial paralysis of the nerves of the respective lung portions; and it may be the consequence of indolence, or of such occupations as do not permit a free use of the lungs. In such cases the upper points of the lungs are those most often affected. There are many other causes which may also, temporarily or permanently, produce similar effects upon the alveoles. In a majority of cases, however, where such occurrences take place, it is the fault of the patient, arising either from ignorance of the facts in question or from carelessness. As this furnishes the basis for real tuberculosis of the lungs, more minute attention will be given to it when on that particular subject.

The over-extension of the alveoles (*emphysema*), the very opposite of the above, is a more specific alveolar disorder, not very uncommon, and about which very little is known outside of the profession. Although, in itself, a positive preventive against tuberculosis, it is, through its complications with bronchial catarrh, often regarded as consumption, and treated as such, very much, however, to the disadvantage of the patient.

Several single alveoles, as we have learned, unite in one general



A schematical view of alveoles in a healthy, and the same in an emphysematical condition.

space, and have one small bronchus as their common air-passage. Between these different alveoles we find very minute separations, like the different apartments of a house, by means of which more space is afforded to the inhaled air, thus permitting an intensely quick exchange of gases. In case of over-extension of this group of alveoles, they may all become blown up into one round bag; in consequence of which the fine separative bridges are lost, the area of space diminished, and a less quick exchange of gases the result. But a more serious consequence arising from over-extension is the loss of the contractility of the alveoles themselves, whereby the exhalations of the air become more difficult, and much slower. Another effect of this slower and enfeebled exhalation is a less prompt and effective evaporation, and expectoration of phlegm or mucus from the bronchi; in consequence of which they may become inflamed, swell, and cause an annoying and sometimes serious trouble to the patient. Should the force of extension increase still more, the already extended bag may burst, and air be forced into the lung-tissue itself, causing inflammation of the tissue, obliteration of circulation, and other very serious consequences. The extent of such disorder varies very much; it may be confined to one group of alveoles, to a lobulus, to a whole or half of a lobus, or, finally, to one or both lungs. The more extensive the injury, the more troublesome will be the effect.

A person with decided emphysema makes the impression of an invalid who has but a few days to live; but here the appearance is worse than the reality. It is not death which threatens the patient, so much as it is the want of breath, the difficulty with which the blood can pass from the right to the left heart, the feeling of suffocation upon the slightest exertion, and the ever-present consciousness of death being at the door. Yet such patients, if careful, may live to a very old age; and have the satisfaction, at least, of knowing that they can never have tubercles in such affected places of the lungs; for if both have been found in autopsy, the tubercles were always primary to emphysema.

The persons most liable to this trouble are musicians who play on wind-instruments, they being obliged to hold and press the air a long time in the chest; glass-blowers—those who use the blow-pipe; and persons similarly engaged, are next most subject to it: intense screaming, and even singing, might possibly produce such an effect. Severe coughing, diseases of the bones of the chest or of the lung-tissue, and especially nervous derangements, may occasion the same difficulty.

It is important for persons suffering from emphysema to *know* that such is their trouble — which, however, is the case only in a very few instances. A small defect of this kind is not very noticeable, and even a physician might not be able to detect it with certainty. The most certain and reliable symptom for unprofessional persons is the fact that they expire — that is, breathe out — slower and with more difficulty than they inspire, or breathe in — a circumstance which is exactly the opposite of what it is in health, or in

other disorders. The chest of a person suffering from emphysema appears fuller than if normal; the diaphragm is continually pressed downward, and the digestion of the patient sometimes interfered with as the result.

Whenever a patient becomes satisfied that he is suffering from emphysema only, he should at once give up any and all attempts to cure it. He should not for a moment allow himself to think or imagine that he has consumption or tubercles. There is probably no class of patients more liable to be made the victims of charlatans, simply because the thing *appears* worse than it is, and because an emphysematic patient, unless well informed, will try, and try again and again, to get cured, which, however, never occurs. The impossibility of cure can be easily comprehended: an india-rubber thread, which has been over-stretched, cannot by any means be made to contract again; and the same is true of over-extended alveoles, as in emphysema.

The only thing a patient of this class can do is to prevent, as far as possible, any complication, especially of bronchial catarrh. Since the blood is prevented from flowing rapidly through the lungs, such a patient should never excite the action of the heart; for example, by going much up stairs or up hill, or getting angry or into a passion, etc., all of which, under the circumstances, are exceedingly injurious. The least exertion will cause the patient to be more or less out of breath, and consequently he should avoid everything tending to such a result. No medicine whatever, under any circumstances, can be of use, but, almost of necessity, must injure the patient. If the digestion be good, and no complication of catarrh, the patient should be well satisfied, and make no attempt of cure.

The bronchial catarrh connected with emphysema is extremely difficult of cure, because the mechanism by which the mucus becomes expelled has been injured. Under such conditions artificial means are advisable; for example, the breathing or inhaling of condensed air in an air-bell, and especially if a very minute quantity of the spirits of turpentine be mixed with it. Living in well-located pine-forests is also of immense benefit to such patients. A well-applied and methodical rubbing of the skin is highly recommendable, as such friction very much relieves and strengthens the nerves of respiration. A patient who fulfils any of these manipulations, avoids exertion of every kind, and has his digestion perfectly regulated, can become relatively cured, so far as to live comfortably — until he tries to exert himself.

As the proper regulation of the digestion is of equal importance in every disorder of the lungs, and to avoid all unnecessary repetition, it will be made the subject of a future paper.

A person suffering from emphysema, if he has the means, should be advised at once to give up all business, and to seek the most suitable climate for his condition; for example, the West-India Islands, Peru, Chili, Mexico, Southern California, the South of France, the Alps, or any region where there is a warm and equal temperature, especially where the fragrance of pine-trees can be inhaled. If a

patient is without the means necessary for change of climate, nothing more can be done than for him to imitate the above at home, as far as possible. He should go out only when the days are fine and warm, and keep his room when the weather is inclement. The use of Seltzer, of Ems, or of any other salty and alkaline spring-water, is highly recommendable, either with or without milk, as the conditions may allow. Freshly made whey, under certain circumstances, is exceedingly valuable, and nothing can supersede its use by such invalids.

If emphysematical patients are careless, they soon suffer from oppressive breathing; the right heart extends, or the valves become insufficient; dropsy makes its appearance; they have attacks of suffocation, especially at night; and if bronchial catarrh becomes complicated with it, they present the most pitiable objects imaginable. At this advanced stage of the disorder next to nothing can be done, except to mitigate, somewhat, present suffering, and make the death as easy as possible.

There is still another condition of the alveoles, namely, that which arises from lack of proper nourishment or proper air. They become extremely delicate and thin; are apt to break and become destroyed. But this affection is very rare, and not of sufficient importance to dwell upon it. It is always connected with other local or general disorders.

Disorders of the Capillary Blood-Vessels.

THOSE dangerous difficulties which are known as phthisis, old-fashioned, galloping, and tuberculous consumption, chronic pneumonia, etc., are all included in this subject. Any one who has studied the medical text-books, will have experienced no little difficulty in clearly finding his way through names, conditions, and distinctions; the reason for which being, that the above-named disorders were known by symptoms, before anatomy was understood. Consequently, as each new anatomical discovery developed new characteristics or marked features, it became necessary to give the thing a new name; and hence we find an accumulation of the old with the new, which, apparently, makes the subject an exceedingly difficult one. To avoid all difficulty of this kind, we shall entirely omit to give reference to the old and usual classification, hoping thereby to render a long-desired and much-needed service to both physician and patient.

If the reader has become thoroughly acquainted with the anatomy and pathology previously given, the importance which was attached to the fact, that the quantity of blood thrown by the heart to the lung should be in *exact proportion to its capacity, to admit of its passing through*, will at once be called to mind. This mechanical process is the key to the whole subject in question; and, consequently, a thorough understanding of it is essential to a comprehension of what follows. All the physical distinctions we have to make are such as would be applicable to other things as well; for instance, steam, water, gas, or water-pipes, etc. If an elastic tube, of india-rubber, for example, be attached to a force-pump, and too much power employed for the capacity of the tube, every one knows that it will, in time, not only lose its contractility, but will break at the point which is weakest. And this is precisely what we observe in ourselves; for, if the capillary tubes are extended beyond their capacity, they temporarily or permanently lose their contractile power. Such an occurrence has been called a *congestion* of the lungs. A congestion is, therefore, a condition which indicates an over-filling, not a rupture; but if a vessel or vessels break, we then call it inflammation of the lungs, or acute *pneumonia*, improperly called lung fever.

A *congested lung* may arise from two causes: 1st, a mechanical one, as we have already seen, and, 2d, a nervous one, the result of a state of paralysis of the vessels, which has been caused by direct or indirect injury to the nerves governing the vessels. In both instances the anatomic-pathological condition would be the same; namely, the extended walls of the vessel permits liquid to escape out of it easier and more readily than it can return back again; for the reason that the vessel, under such condition, cannot contract and empty itself of its contents. The blood, however, does not directly cease running through the vessel, but the liquid in the elastic meshes around the vessel cannot come back into it, but presses upon

the alveoles (air-cells), thereby causing them to collapse, which produces a condition of difficult breathing, and, if the injury be general, of actual suffocation. This condition is known as dropsy of the lungs (in medical terms, œdema, serous pneumonia).

This disorder occurs in animals, after over-exertion, as well as in man. Over-driven horses and cattle, for example, exhibit it more or less, as well as soldiers who are over-marched, or other persons who have over-exerted themselves by unreasonable dancing, running, etc. It also accompanies states of exhaustion; and long-continued fevers, bad medication, is the invariable consequence of improper venesection (bleeding) or cupping, and is that of which consumptive patients die after severe hemorrhages. It is characterized by oppressed breathing, which becomes worse and worse; by a short, hacking cough, without expectoration, at first, but continued without rest, complete exhaustion, livid eyes, cold extremeties; then the expectoration of a thin, white, foamy, or frothy liquid begins, by the color of which it is distinguished from real pneumonia. The pulse-beats become weaker and weaker as the process advances, so much so that they cannot be counted at all; and, when complicated with another disease, invariably results in death. The patients die of actual suffocation.

If its origin is merely mechanical, it is curable; but the process is very slow, and the cure seldom complete. Lungs thus injured, never again acquire their former elasticity and contractility. The magnitude of the area of the injury, however, here plays an important part; recovery from small defects of this kind may occur in a comparatively short time — perhaps in a few days. But when both lungs are injured, a complete or radical cure is not possible. Young colts, that have been over-run in a race, exhibit the best picture of it; such animals never recover their former vivacity or usefulness; and, although they may live, they present but a sad picture to look at. The disorder is very rare in children, but, if a child becomes thus affected, it very seldom recovers.

The treatment is as limited as it is simple: it consists in complete rest, and nothing else. In cases that are the result of other diseases, it is but simply an act of mercy to relieve the sufferings of the patient by the use of narcotics, ether, chloroform, hydrate of chloral, etc., and thus make his end calm and tranquil. Dropsy of the pleural cavity and of the sack of the heart is almost always — and of the eyelashes and glottis not unfrequently — complicated with this disorder.

Intimately related to œdema, though very different from it, is that condition which is known as *acute pneumonia*, inflammation of the lungs, or acute lung fever. The former is a passive process, the latter an active one. To assist the reader in understanding this difference, we may take two cases of a broken limb, which in all respects are alike, *except* that one was the result of an *unconscious*, and the other of a *conscious* fall, or blow received. Here, as every surgeon knows, there is a decided difference; for in the case arising from an unconscious fall or blow, the muscle-cells were passive at

the time of injury, while in the other they were active, and the injury consequently more severe, as far as the mechanism of the injury is concerned. The passive injury is commonly more general, the active more partial or circumscribed, but nevertheless more severe or active in the respective part injured. The whole of both lungs may be affected with œdema at the same time, while this can never occur from pneumonia, it being always partial or limited. But the blood-vessels in those parts have to suffer a far stronger shock than in congestion of the lungs, and consequently the direct symptoms are much quicker, and more decided. Congestion of a lobulus, for example, would not be productive of any symptom, but with pneumonia of the same lobulus the symptoms would be decided, though not so strong and marked, as when a whole lobus is affected. Another illustration or two may serve still further to exhibit this difference. If a person were to receive two different insults of like character, one with perfect calmness and self-control, the other with great excitement and passion, the effect would be similar, and yet very different, as any one can readily understand. Or should a cannon-ball simply hit a substance which is at rest, the effect would be different from what it would have been, had two cannon-balls, shot from opposite directions, hit each other. In the one instance the impact, or shock, would be the result of a *single* force, in the other of a *double*, and opposing one. And this is just what makes the difference. Force struggling with or opposing force. In the lungs this active agent is found in the greater resistant ability of the blood-vessels, as well as of the whole lungs; hence a greater, but shorter, struggle, and more serious and direct injury. Consequently in œdema the vessels gradually enlarge, while in pneumonia they enlarge all at once, and invariably burst, thus permitting the escape of blood into the tissues; in the first, where we had only blood-water, we have here to do with real blood. We therefore naturally find the first (œdema) more in weak, delicate, or old and shattered bodies, and the latter (pneumonia) more in strong, healthy, and vigorous subjects. There is, of course, as everywhere in nature, a line where both become identical, but we have made the marked distinctions to show the difference. It can also be easily understood that both may occur in the same lungs, but at different times and places.

Acute pneumonia is one of the most common diseases, and a large number annually fall victims to it; a great many, however, unnecessarily so. The cause of pneumonia is abnormal excitement — physical and mental — and the more unusual such excitement may be to the body, the sooner its effects will appear, especially when physical and mental are combined; although, apparently, the most different causes may tend to produce it, this principle will hold good in all cases.

Pneumonia, although a sudden and more severe injury to the respective parts, readily shows, from the fact of its being an active injury, a tendency to spontaneous cure, or to heal of itself. As this disorder, in its acute form, has nothing to do with consumption, but

very much to do with it when not properly healed, or having become chronic, we shall here say a few words about it. The first symptom a person so afflicted experiences, is a severe shock to the nervous system; either a severe chill, and consequent heat, or vomiting, or even sometimes convulsions, especially in young subjects. There is no cough, but a decided general depression, loss of appetite, and increasing loss of strength. The pulse goes up steadily, and in exact proportion to the extent of the injury — and so does the animal heat. A day or so afterwards, shortness of breathing becomes marked, and with this symptom patients begin fully to realize their position. This is usually the time when a physician is called in, and expected to afford help in a few minutes. But the begun process cannot be checked, nor be interfered with in the least, without serious injury to the patient. Every attempt of this kind, at once shows a bad and incompetent physician. It is his duty, however, to keep the patient cheerful, and in good courage, who at the same time breathes shorter and shorter. Acute pneumonia has its certain course and certain limit, when it gets better; but the physician's duty is to bring the patient over this period without injury. There is no acute disease existing in which a physician can exhibit more skill, although he has not the least control over the injury itself. By means of physical examinations he can predict with absolute certainty the day when the patient will get better; he knows also, very nearly, whether he will be lost or not, although there is a line so fine, that no human being could define this in the living subject. All depends upon keeping up the nervous power of the patient — not by medicine, nor by food, but by management. The absolute certainty of the physician's opinions, in connection with something being constantly done to relieve the mind of the patient, is here the great, and, I may say, the unfailing remedy. Light poultices, cold applications, a few leeches upon the chest, changing with a small mustard plaster here and there; a little medicine of an exceedingly harmless character, to relieve; constant changing of position without the assistance of the patient; good fresh air, and good and confident nurses, always and invariably result in success. All venesection, digitalis, quinine, tartar emetic, iron, veratria, morphine, or similarly strong agents, with us, belong to the history of the past, and we strongly maintain that they have neither right nor reason for ever being seen on the table of a patient suffering from pneumonia, however strongly recommended! ! ! The actual help of the physician comes from five to eight days after, when the patient begins to feel better; the reabsorption of the exudation begins, and the patient expectorates freely a reddish and foamy mucus, which becomes thicker and thicker. Now come the regular examinations of the chest, and the advice and aid of the physician to keep the patient from getting up too soon, or staying in bed too long. The regulated digestion now begins to be effective, and, if inside of three months the ear of the physician no longer detects the sharp and crispy respiration so distinct in pneumonia, then, and not until then, the patient is cured. A neglect on the part of the physician, or of the

patient, brings the latter to the great army of consumptives; more than fifty per cent. of which are of this stamp. *The lighter the pneumonia the greater the danger!* but here the physicians are less at fault than the patients; for, as anxious as they are to see the doctor when down, and nearly suffocated, they are just as anxious to get rid of him, to avoid what they regard as his unnecessary care, and his fees! no matter how honest and careful he may be. We know how very difficult it is to convince a patient suffering from pneumonia of only a small lobulus to take his bed for a few days, in order to be completely cured. No,—they know better; but some two years later, they are on the slow road to the cemetery. It is nothing but a little cold, and an opiate will readily cure it—*but how*, let the millions who linger for years, as it were, upon the verge of death, dragging out a miserable and dying life, tell!

A chronic pneumonia always has its beginning as acute pneumonia, and is invariably the result of neglect in treatment. Pneumonia of a lobus is so severe a disease, that both patient and physician are obliged to attend to it, and consequently it results less frequently in the chronic state. But acute pneumonia of a lobulus is so small an injury, that usually neither patient nor physician become aware of it, and, most generally, it forms the basis for the after-developing chronic state, or real Consumption, phthisis, new-fashioned Consumption. It is only of late that the American physicians became acquainted with this disease, through Niemeyer's excellent treatise upon it, though recognized by the public for a long time previous. We have often heard that the old-fashioned Consumption was gone, and that another kind had taken the place of it; and we have been asked, How it was that Consumption had changed? Those who have read, with attention, the general pathology, previously given, will remember the pictures there drawn of these two different disorders; and, if the reader will, for a moment, reflect upon the changed life of Americans, and compare it with that of fifty or a hundred years ago, he will readily comprehend why chronic pneumonia has over-reached, or taken the place of, tuberculosis, or old-fashioned Consumption. The honest, slow, easy, and unimpassioned American of the eighteenth century, had tuberculosis; the racing, hurrying, excited, and sporting American of the nineteenth century, has chronic pneumonia; he has no time for tuberculosis.

Since chronic lobar pneumonia, occasioned by the acute form, is the result of the direct neglect of the patient, or the consequence of ignorance and neglect on the part of the physician, and not of very frequent occurrence, we shall not detain the reader by describing it here. With lobular pneumonia it is widely different, for, in fifty cases out of every hundred, it is the starting-point for consumptives.

As previously explained, when on the subject of anatomy, a lobulus is one of those little compartments which forms or constitutes a small part of a lobus. In lobular pneumonia this lobulus, or little compartment, becomes filled with blood which escaped from the blood-vessels in consequence of their being ruptured; one lobulus,

at least, is always filled, but there may be two, three, and even more. This escaped blood must either become reabsorbed by the lymphatic vessels, through the pressure of the healthy tissue exerted upon it, or it must degenerate. If the escaped blood is reabsorbed, as indicated, the injury is cured; but if it degenerates, Consumption is the inevitable consequence. This degeneration varies, or differs in character, in accordance with the resistant power of the blood-globules, or cells, and the surrounding circumstances, but is always a passive one. (See previous paper on Degeneration of Cells.) The degeneration which is here the most favorable, is the one which is termed fatty; by which the blood-cells become yellow, losing their pigment, or coloring matter, and become a mass of thick, tallowish matter, which, under the microscope, shows the remains of original cells, and fat molecules, intermingled with pigment and crystals of blood-salts. This form of degeneration, however, is not very frequently met with; the usual course being that the blood-cells form into pus-cells. They lose their pigment, as in fatty degeneration, but become cloudy and grayish, and, under the microscope, show the peculiar pus nuclei, their edges shrivelled, and not so even as blood-cells. They now irritate their neighboring healthy cells to active degeneration, resulting in the production of new tissue-cells, which form a kind of capsula around the pus. It sometimes so happens that this capsula grows so tight and secure that the pus thereby becomes incarcerated, and consequently inert to the organism, by total exclusion. But this is only an exeption, and not the rule; the capsula generally breaks immaturely, or before it becomes strong, and the pus escapes into the other healthy parts, causing new irritations and new destruction. It is in this way that those large cavities which we find in lungs thus affected are formed. The changeability of the symptoms of this disorder arise from the peculiarity of this process. Patients will feel very well for a few weeks, and then, all at once, become deadly sick again. The constant absorption, by the lymphatics, of the liquids which ooze, or percolate, from the pus, irritate, thereby, the whole blood, causing feverish pulsation. Finally large blood-vessels become exposed to pus, their circulation interfered with, diseased blood-cells come into general circulation, get caught in other lymphatic or blood-glands, cause degeneration there, and so on until the whole system becomes infected, and the organism perishes. This latter state, or condition, is what is termed galloping Consumption (*acute miliary tuberculosis*), and is a ready, or quick, result of any accumulations and absorption of pus or kindred cells. This whole process progresses with more or less rapidity, according to the magnitude of the area of degeneration, the resisting power of the body generally, and the circumstances under which such patient lives.

The external symptoms are the same in lobular as in lobar pneumonia, only less marked or prominent. It is quite easy for a physician to detect a lobar pneumonia, but, on the other hand, just as difficult to define it in a single lobulus. The well-trained ear, alone, is here the only means of detecting it, the place being too small to

be detected by means of percussion, which here shows no difference. The patient who, from lobar pneumonia, is very soon obliged to take to his bed, would not think of doing so from so small an affection as pneumonia of a single lobulus. In fact, the symptoms felt are so slightly marked that it is a matter of great difficulty to convince the patient that anything ails him. Perhaps a very slight pain, a little insignificant cough —or no cough at all, according to the sensibility of the nerves — a very slight chill, and a little general feeling of being unwell for a few days, is all that is felt or experienced. It is but seldom that a patient applies to a physician at all in such cases; and if he does, no particular examination is made; a little medicine is prescribed, the symptoms disappear, and the treatment ends. A little cold! is the general diagnosis. Should the patient fall into the hands of a physician who understands the case, and explains to him the danger, an incredulous laugh is the almost invariable effect, and another physician is soon sought, who cures him in quick time. There is, perhaps, no physician living who has had more of this sad experience than the writer. Not only is the advice which is given laughed at, but the patient finds it necessary to ridicule it for the benefit of others who might possibly intend to seek and pay for similar advice, such course being supported by some ignorant or designing family physician; but all such patients have gone home to the great army — and unfailingly so! Not unfrequently, however, they have appeared again for help when too late, a sad picture of death, and only too sorry for their laugh. If it could ever be learned that all great evils spring from very small sources, there would be no more consumptives, and no more battles fought, nor any other wholesale nonsense committed; hence we well know that this experience is not likely to decrease or to become better.

As previously stated, the smaller the injury, or rather the smaller the place where blood has escaped, the greater is the danger, on account of the very slight symptoms accompanying it, and of its being overlooked. In examining the history of consumptives, they invariably recollect where they received the very first little injury, although it is generally so long in the past that their memory requires to be quickened or aided by the physician. But as soon as they are brought upon the right track, they are invariably able to account for symptoms up to the then present time. The symptoms vary considerably according to the locality, or place, of injury. If in those parts which are generally used in breathing (the right lower and the lower part of the left upper lobe), there would be more recurrent symptoms—tickling in the throat, constant irritation to cough, catching breath, difficulty, or rather a feeling of difficulty, in respiration, restlessness and uneasiness, with other similar slight signs of injury, which to describe minutely would require too much space. Similarly slight symptoms occur on the escape of blood in the right upper point, or in both upper points, these parts of the lungs being only required for use when in exertion. The symptoms being so slightly marked, the parts affected not in constant use, and the patient feel-

ing but little inconvenience, his attention is not aroused to it until complications with bronchial catarrh have occurred. If these little symptoms are overlooked, the next invariable symptoms are those which arise from the *complication of the first injury with capillary bronchitis*. The patient begins to cough more severely, and also to expectorate the thick phlegm peculiar to bronchial affection. This is generally the period when the services of a physician are sought. And we here boldly say, that perhaps one physician in a thousand is sufficiently educated in this direction to diagnosticate the true condition of things. The education of medical students, in the first place, is not sufficiently thorough and exact, and then there is a peculiar carelessness of professional conceit which is very strong in busy practitioners, together with the stinginess or unwillingness of patients to pay for a proper examination, it being quite unnecessary, in their estimation, to pay so much for what they regard as so little trouble; all combine not only to produce, but also to perpetuate, this incapacity, or lack of knowledge, in the direction indicated. If the physician is ignorant or incompetent, he prescribes some narcotic soothing medicine; the cough ceases, and, for the time being, the matter is settled. A few months pass, and a new cold is acquired, which is treated in a similar way, and repeated as often as a fresh *cold!* is taken. The result in general is, that when a competent or real specialist is appealed to, the patient has reached a point in the history of his disorder after which it is impossible to do anything for him with the view or hope of effecting a cure. This is the old story which remains always new! The object of the physician is to ascertain whether he has a case of tubercular infection, pneumonic exudation, or simply bronchitis. To the educated ear this offers no difficulty; to the ordinary family physician it is simply impossible. The accurate diagnosis of lung diseases is an art in itself, and can be studied according to the text-books which exist on this subject, *only* under the guidance of a competent specialist. We simply mention this fact here because that almost all ordinary practitioners pretend to understand all about it, and, further, to warn *all* patients suffering from lung disease never to place reliance in the diagnosis of a general practitioner, or so-called family physician, for the simple reason that it is absolutely impossible for such physicians to be masters of the subject.

In disorders of the lungs it is especially important to ascertain the complications and their first origin. If bronchitis was primary or first, and pneumonia the consequence, a knowledge of this fact is important for the treatment, and the case less difficult; but if pneumonia was primary, and bronchitis secondary, then the case is much more difficult, and the treatment more lenient, requiring both time and patience on the part of physician and patient. If there are complications with pleurisy or exudation into the sack of the heart, the treatment becomes still more difficult. In chronic cases it is important to know what sort or kind of an exudation we have to deal with, and in which state or form of degeneration it is in just then. To ascertain this is exceedingly difficult, and very often

impossible; still modern explorative methods have made it possible in many instances. A bad digestion is almost invariably a companion of this form of Consumption; its correction, however, is not difficult, if rightly begun. The prognosis in any of these forms of phthisis is not a favorable one in the best of those cases which ordinarily come under treatment, on account of the time which has elapsed since the first injury occurred, when the cure would have been easy. There is, it is true, the possibility of partially curing a degenerated lobe, but it is a very limited one; the difficulty of getting air into and between the sick parts is here a prime obstacle. A fatty degenerated lobe may be managed a long time in such a way as completely to satisfy the patient; but all the other forms of degeneration are bad. Where there is an emptied cavity large enough to be diagnosed, the patient cannot recover, a cure being absolutely impossible. He may, however, be so managed that life may not only be made comfortable, but prolonged for a considerable time. If diffusion of pus into general circulation has already taken place, the patient has no chance whatever; all that can be done is the regulation of the digestion, which of itself is extremely difficult in these cases. The general opinion of physicians is, that chronic pneumonia is readily curable, and tuberculosis absolutely incurable. This is a very great mistake, as we shall show, when on the subject of tuberculosis; but admitting that both are curable, chronic pneumonia is but seldom, while an arrest (cure) of tubercles is comparatively easy, and to a certain limit unfailing. The view of the curability of chronic pneumonia is especially revived by Niemeyer, but we doubt of his having effected a single cure in his life, though he helped a great many. We have never succeeded in curing a decided case of chronic pneumonia, while to arrest tuberculosis, in cases not too complicated, has been a matter of no difficulty.

The use of cod-liver oil has acquired a great reputation in chronic pneumonia, for the reason that in poorly-fed individuals, when given early enough, it causes a tendency to fatty degeneration, which is preferable to any other form; but from the fact that patients seldom yield to judicious treatment until after the degeneration of pus cells has begun — when it is too late — this seldom occurs. The same is true of alcohol. It becomes converted into, and causes the absorption of more fat, and consequently is the same in principle as cod-liver oil. Those cases reported as cured by the use of cod-liver oil or alcohol, exhibit fatty degeneration of the parts affected; patients so cured (or rather reported cured) can live for some time, and be relatively well. But since chronic pneumonia in that state or stage of progress when alcohol is of any use is wholly curable, partly by absorption, partly by expectoration, we find it absurd to recommend it in any stage of phthisis, except where the case is absolutely hopeless, and the patient too poor to do anything else.

The treatment of chronic pneumonia consists of three features: first, the bringing into the body and causing them to digest, and to be absorbed, such material as is required under the condition — digestion; second, to cause absorption from the exuded masses by

the lymphatics, and as much as possible — absolute rest, and general treatment of acute pneumonia; third, the causing of the expectoration of such matter as is neither capable of, or fit for absorption — the forced treatment consisting of such exercises of the chest as from its anatomy and mechanism shall fulfil this (these exercises will be minutely described under tuberculosis).

In no branch of medical science does there exist a disorder in which the skill of the physician can be more displayed than in this form of phthisis, and no one in which he would gain less credit. The late Prof. Niemeyer exceeded by far all his colleagues in the treatment of this disease, and it will be difficult to find his substitute in Europe. The first feature of treatment — digestion — is at once a field or subject requiring a knowledge of almost the whole of the natural sciences. The physician must be a chemist of no inferior skill, an exquisite physiologist, and a perfect cook. As an illustration of the manner in which these sciences have to be practically used, we get, for example, a patient who has been sick for six months; the diagnosis being chronic pneumonia of right under, and left upper lobe, fibrinous exudation, incipient bronchitis, acute febrile symptoms not entirely gone; consequently, the pulse and heat variable, no further complications, but digestion poor, occasional night-sweats, strength, comparatively speaking, not exhausted, and very nervous. Here we know that reabsorption to a great extent may take place, consequently we put the patient to bed, and induce such absorption by light poultices on one side, and by occasional light irritants upon the respiratory nerve on the other side. The next thing to be done is to regulate the digestion. This patient, and all of like character, will invariably exhibit a desire for acids, because there is an excess of fibrin in the blood which becomes increased when absorption begins. Very seldom do they ask for salty food, which would indicate a preponderance of albumen. It is our direct object to free the blood from this excessive fibrin, and to prevent its re-formation.

The fever, though somewhat abated already, we have to diminish by the rest given; but the use of vegetable acids is here absolutely necessary. This acid may be lemon-juice, pure or in lemonade, or the juice of fresh sour apples or grapes, lactic acid formed by milk when standing, or buttermilk a few days old, or whey made from sour or sweet milk, by lemon acid. This fare may be changed with tomato sauce, blanc-mange, rice boiled in milk, soups made of wine or beer, of vegetables, bread, and sometimes with some meat, boiled fresh fish, like trout or smelts, ice-cream, tamarind water, fruits of acid taste, fresh butter and toast, etc. In case of constipation, a very light purgative is indicated, changed occasionally with some aromatic bitter extract, as the case requires. In this way we shall observe that the pulse falls steadily until it has reached its normal number of beats, or at least below ninety. The next point is to get the patient out of bed. The correct order for this in due time is one of the most difficult in medical practice. If the patient is allowed to get up too soon, reabsorption is arrested; while, on the other

hand, if he is kept in bed too long, fatty or cheesy degeneration takes place, which prevents the expectoration of the exuded masses. If the patient leaves the bed and fever returns, he has to be brought back immediately. From three to four weeks is about the average of time required for rest, though it is sometimes longer and sometimes not so long. When the patient has so far advanced toward recovery as rightly to leave his bed, the diet should be stronger, and extended to the use of beef-steak, roast beef, and the like, according to the cravings of the patient. The best steak for a patient is to take a tenderloin or sirloin, free it entirely from tallow or fat, put a little fresh butter into a thin pan, when hot put the steak into it, salt and cover, let it cook two minutes, then turn and cook two minutes —four minutes in all—when it is done. No steak can be made superior by broiling or in any other way. Onions can be cooked with the butter, for flavoring; to do this, the butter in the pan is mixed, when on the fire, with some water, pepper, if required, seasoned to taste, and used as gravy. The patient must, however, take meat but once a day, and sometimes only once in two days. The above bill of fare, changed somewhat by the use of sardines, or, perhaps, of a little stronger soups without grease, oysters, etc., will fill out the rest. The patient should never eat quite as much as his appetite craves, and never eat the same dishes twice in forty-eight hours. He has next to be taught to walk out of doors at regular times and intervals; any kind of weather is good except when strong winds prevail. He must walk erect, and learn to inspire and expire correctly and fully, and lie down when at home. By means of lung-gymnastics he must exercise regularly in inhalation and exhalation.

To fulfil these requirments, we have constructed exercises which are every way calculated and adapted to accomplish the object in view. In this way the patient must get stronger every day; his pulse must never rise more than ten beats in exercising or walking. He must sleep soundly and refreshingly, and expectorate easily and largely. His appetite must be perfect under all circumstances. In the next place comes the rubbing off of the body with rough towels wet in cold sea-water, after which the patient is put into, or wrapped in a blanket, and required to lie down. This should be done in the morning at first, and afterwards at night and morning. No chill must be allowed to occur during this process. Such a patient should neither ride on horseback, nor in a carriage, nor should he sit much in chairs. When he has recovered so as to appear perfectly cured so far as his feelings indicate, and percussion and auscultation eliminate nothing except the continued sharp and rough expiratory breathing—no exudation nor severe bronchitis—he may be allowed or advised to travel in mountainous regions, where there is fine scenery, fine forests, and pleasant accommodations. It must be understood that all his travelling among the mountains and forests must be on foot. After this he will be fit for his business again. It is in this way, and in this way *only*, that a patient suffering from phthisis must be treated and can become cured. Such treatment requires at least a period of eight months, and generally longer. This is an

illustration of a curable case of chronic pneumonia; but it is seldom that we meet with such patients, and if so, still more seldom that they have sense and patience enough to undergo so slow a treatment. They had much rather go South, West, East, or North, try all kinds of wonder doctors and curative medicine, which simply has no other effect than to bring their approach to the grave a little sooner than otherwise. The general condition of patients who apply for treatment is such, that with them no cure is possible under the circumstances.

The majority of patients who present themselves for treatment, have reached a point in the history of their difficulty from which a cure has become either very doubtful, or absolutely impossible. In general, they have been sick from two to ten years, and yet expect to be cured in a month or two. It is both painful and astonishing to witness the high expectations of patients having large cavities — two inches by four — in their lungs, and who are but just able to support life by the little free lung that is left for use. It would, however, be inhuman — the greatest cruelty — to awaken them from their happy dreams. Under such circumstances, the physician feels compelled to encourage his patient in the expectation and hope of a cure, though he knows full well that he cannot live another year. The real condition of the patient should be made known to *no one* except to a *reliable friend* of the sufferer, who will keep it to himself. The ambition manifested by these patients, and their determination to recover, is still more painful to witness. As soon as their digestion has been regulated and in good order, they imagine themselves already cured, or certainly very nearly so. They have become so used to their miserable condition that the least improvement brings them into a state of the greatest happiness. They revive so as happily to enjoy their last days, and generally die before they have any idea or painful thoughts of such an occurrence. This is the most that medical aid can afford in these cases. To pass away with cheerfulness and without pain, or as one falls asleep, is, if we look at it coolly, all that we can reasonably expect in the end of life under the most favorable circumstances. We consider it the height of success when an incurable patient has been managed so as to die while engaged in conversation, or while asleep, without pain, oppression, or painful premonitions of any kind. Any one who has seen the sufferings of those who had been treated with opium, morphine, and similar narcotics, or inhaled vapor, or otherwise forcibly medicated and dieted, will readily agree with us in this.

To determine whether a patient is curable or incurable is very difficult, and often impossible; because it is not from the lungs alone that it can be determined, but rather from the whole of the glandular system together, especially the lymphatic glands and the brain. Experience and observation, as well as experiments, have shown that it requires but a very small accumulation of malignant pus to poison the whole system; and since the means of detecting *one* infected abdominal lymphatic gland, or of a circumscribed obstruction

of capillary arterial circulation in the brain, are very limited, and considerable observation and time, under all circumstances, are required, the very best informed and most careful specialist may err in his prognosis in regard to the final results obtained. We consider it the better plan to regard all cases which come up for treatment as curable, unless they present distinct and unmistakable signs of absolute incurability; such, for example, as large cavities; repeatedly returning fever, and abnormally high temperature of the body; gradual and steady loss of muscle under regulated digestion. The occurrence of occasional headache and diarrhœa are very unfavorable and dangerous symptoms; but, though unfavorable under all circumstances, may be but temporary, and occasioned by neglect on the part of the patient. The mere loss or gain of weight has no more significance than it has with an absolutely normal, or healthy, body, though generally regarded otherwise. In practice, our experience has taught us never to give up, in any case, until the patient shows actual signs of dissolution.

In all cases, curable or not, two things must be achieved: 1. The procuring of sleep without the use of medicines. 2. The rectifying and securing of a good digestion. And, difficult as this may be in some cases, it is possible in *all*.

To insure sleep, in any case, is not difficult, provided the patient has not habitually taken opiates or alcohol. The reason why patients suffering from chronic pneumonia cannot sleep, is either because they have eaten food which they cannot readily digest — the gastric juice not being sufficiently powerful to dissolve it, and the sympathetic nerve thereby irritated, which, by reflex action, keeps the cerebral nerves in a state of irritation, so that such patients appear extremely nervous and wakeful — or there is an obstruction of mucus in the bronchi, which irritates the pulmonal plexus of nerves in a way similar to that of the undigested food in the stomach, producing the same effect on the brain. As soon as these two causes are removed, the one by preventing the use of unsuitable food, and the other by a proper cleansing of the respiratory passages, the patients will begin to sleep of themselves. If, however, the patients have been in the habit of morphine or alcohol narcosis, the above will not, of itself, be sufficient. It will be necessary here *gradually to decrease or lessen* the amount taken, but not abruptly, and at once arrest or exclude it. In general, we decrease the dose of morphine, or change with hydrate of choral or still more harmless medicines, without the knowledge of the patient, leaving him to imagine that he is taking sleep-procuring medicines all the time. We have sometimes succeeded by simply giving a little odorized sugar, lupulin, or extract of wild lettuce, according to therapeutical rules; and we have often succeded by putting a moderately warm dry or moist bandage over the eyes and head; and also, by ordering some person whom the patient happens to fancy very much, to use his hands, moving them lightly and softly over the face, etc., etc. Much also depends upon a proper arrangement of the bed, so as to place the patient in a position in which he respires easily, and yet

lies comfortably. The sleeping-room of the patient must always be properly ventilated, and not used during the day. The bed-clothing should not be too warm, nor yet insufficient, as the patient should experience neither cold nor heat, but simply feel comfortable. The rubbing off of the patient with a towel wet in cold salt water, has, in many instances, an excellent effect. Sometimes we allow patients to change their locality, but not often, as changes are but seldom enjoyed by invalids. In the use of the above, or similar means, we have never failed to secure night rest in any case that has come under observation. A sound, refreshing, and natural sleep alone brings these unhappy patients to perfect delight; and the more so, in cases where they have not enjoyed sound sleep for months, or perhaps for years. And when the patient has once been brought to the enjoyment of sound and regular sleep, he will continue to have it, without interruption, unless there be some neglect or mistake. During a practice of fourteen years, with almost none but hopeless consumptives, we have never failed to secure night rest in any case; and in all this time have not used, altogether, more than *twenty grains* of morphine.

The cleansing of the bronchi from phlegm is not difficult, except in some cases where there has been bad medication in the beginning. It is accomplished by proper inhalations and deep inspirations, by will, or by appropriate exercises for the purpose. The regulating of the digestion, in bad cases, is a great deal more difficult and variable. This difficulty arises from the invariable difference of treatment required for each case. What suits one patient would injure another; and for this important point there are no general rules to give. A few examples, however, may serve somewhat to illustrate it. We have a patient who is very sensitive to fat, which makes him sick, and consequently has eaten nothing of a fatty character perhaps for years, though it is what he very much needs. In a case of this kind, the fat must be of a very thin or fluid character, such as fresh olive oil, for instance (olive oil, when fresh, is always of a greenish color, and without odor of any kind), or fresh butter, or nut oil. This, in the form of an emulsion, must be so thoroughly prepared and bound to some more solid substances of a vegetable or animal character, so that no fat can be detected except by means of the microscope. If the stomach is properly cleansed from mucus, and prevented from insults through the use of injudicious food, every patient will readily digest fat in this form, and soon feel its good effects. Some patients object to meat; mostly those who have taken cod-liver oil or whiskey, though sometimes because it invariably gives occasion of annoyance in their stomach. The reason of this annoyance is, that the cod-liver oil or alcohol, previously taken, caused chronic inflammation of the mucous membrane of the stomach, or that the meat had not been cooked properly, or in a way that was correct, or that the meat was given in too much the same preparation, or that it was too greasy, or at least that it was not given in proper connection with other eatables.

Raw meat, which we often give, and, when properly prepared and seasoned, is at once tasteful and beneficial, we advise patients not to take, unless they know and understand all about it. For if such raw meat is from animals which had not been perfectly healthy, or which contains the eggs of some parasite, or had not been properly killed, or if the meat should be too old, and filled too much with blood, it is not only unhealthy, but dangerous practice. Very few people, not excepting physicians, know or understand anything about the meats found in the markets, as butchers will very readily testify. The raw meat extracts for sale, even Liebig's, we regard as not only bad, but abominable, and should never, under any circumstances, be eaten by invalids, because they are totally unfit for food, no matter where, or by whom they may be prepared. With properly preserved meats, however, it is different. It very often occurs that patients can eat nothing without distress and annoyance. Some *well prepared* raw meat will here do excellent service, but it is mostly necessary to cleanse the stomach, when they begin to digest in a normal way. A person who is not an expert cook, has no conception of what can be effected by cookery in the treatment of disease. If a person can make a soup that will agree with *any* man's taste and stomach, we consider him a person fit to make soups. A cook, for an invalid, must be able to prepare the same meat in so many different forms and tastes, that he can, if necessary, supply fifty different dishes from it, and to prepare vegetables in such manner that they are not only tender, and easily digested, but highly tasty and nice. It is comparatively easy to cook for a hotel or for a dinner-party, but much more difficult, requiring much greater skill, to cook for an invalid. But it is not the cooking alone. The food must be selected and prepared in such an order that it becomes medicine and food at the same time. It is in this way that we introduce into the system fat, albumen, fibrin, acids, ballast, irritants for the nerves, sulphur, lime, silica, iron, etc., and in the same way we reduce superfluous fat, or nitrogenous combinations, or superfluous phosphates, or acids, etc. To do this, one must not only be acquainted with the laws of physiology, but also with the symptoms by which such exchanges are indicated; a knowledge not as yet found in medical guide books, and of which even physicians, in general, have scarcely a conception. It is only four years since, when even in the University of Vienna, Germany, that no one knew how to ascertain whether albuminous or fibrinous blood was in excess, except by chemical analysis, while to ascertain this is the easiest thing in the world. In case of fibrinous excess (*fibrinosis*) the patient craves acids, and, in case of albuminous excess (*albuminosis*), he craves salt. This is very simple and easy after knowing it, but very difficult to discover, or to find out all the facts, etc., in the first place. When only twelve years ago we demonstrated that certain vegetable acids reduce the fibrin and other nitrogenous matter in the blood, giving the reasons therefor, we were laughed at; while to-day almost all physicians use these acids, though probably for the most part not knowing the reason why. These statements are

made simply to show how new or recent these discoveries are, and how difficult it is for medical men to manage cases, inasmuch as the medical knowledge taught in the schools here is of a character to deserve anything but confidence. The knowledge of the chemico-physiological processes is not yet perfect, and requires many years of toil, labor, and experiments, but in the ordinary medical practice, both here and in Europe, it has no perceptible influence; and hence the unsuccessful results, and experimental *failures, of medical practice of all schools*, or short-brained dogmas. Medical practice in general is from fifty to five hundred years behind medical science, and in all probability will continue to be so, because it is much easier to practise in accordance with some learned scheme, than to grapple with the difficulty of comprehending and advancing anything from a scientific point of view.

Of all the medicines existing which are recommended, there is not one that is based upon science, or that is entitled to the least credit, or which could, under any circumstances, do the least real good. Physicians in general have never known enough about Consumption, in its endless complications, to do anything either to prevent or to remedy it, and hence, since these disorders but seldom heal of themselves, as is the case with most acute diseases, the absolute incurability theory was accepted. The opinions of the public in general, and of the patients themselves, are so utterly absurd, that it is hardly possible to describe them. Views and principles worthy of the dark ages, such as humors of the blood, inheritance, contagiousness, flying in the air, or hidden in the soil, or in beds, and houses, together with the most absolute hocus pocus ideas, confound the views of the patients and of their friends in such a manner that it often becomes quite difficult to bring them to reason, and to submit to the treatment demanded by common sense and science.

One of the most absurd things in practice is, the requiring of a person to travel who is suffering from chronic pneumonia. This is exactly like requiring a person to run who has broken his leg. In tuberculosis, however, it is different, as we shall hereafter see. The physician who sends patients suffering from chronic pneumonia to travel, either from ignorance, conceit, or from imitation of some so-called or mock authority, or from all combined, we hesitate not to pronounce a criminal and a quack. A physician who undertakes to prescribe or direct unfortunate patients who come to him in full confidence for help, while he is conscious that he knows nothing about it, is like a man who undertakes to conduct a ship over the ocean, without knowing anything about navigation. To comprehend this villanous folly, one must listen to the stories of the unfortunate patients themselves. But why did you do so? Dr. So and So recommended it, is the invariable reply. And these physicians who advise their patients, and often their own friends, voluntarily or involuntarily to such absurd actions, in general occupy honorable positions. A physician is not blameworthy for not being thoroughly conversant in all the branches of medical science, since this is nearly impossible, but he is to be severely blamed, and held in contempt, when he

undertakes to do what he knows he does not fully comprehend. If a physician cannot diagnose chronic pneumonia from bronchitis, tuberculosis or pleurisy, he is absolutely unqualified to give advice, and if he does give it, he commits malpractice. Of all the patients suffering from chronic pneumonia whom we have seen, there is not one who had not been injured, more or less, by some medical adviser; and we have seen only one patient, severely sick with tuberculous cavities, who had lived properly, and was advised correctly as to his living. He had been sick for twenty years, and still lives, doing business; but he travelled, and got his medical advice in Paris. Had he followed any other advice he would have been in his grave ten years before we saw him.

We advise patients, if they consult a physician about any disorder of the lungs, to demand a specified drawing of the disorder, for reference. A physician not able to give this, is certainly not qualified to treat lung diseases. Since it is impossible to misunderstand a drawing, patients have a better guarantee in reference to it, and, besides, it is easy for another physician to see whether the one that made the drawing understood what he *saw* and *heard*.

Disorders of Capillary Blood-Vessels.—Tuberculosis.

THAT particular form of Consumption called tuberculosis, tubercular Consumption, old-fashioned Consumption, chronic phthisis, latent phthisis, etc., is very distinct from chronic pneumonia, as well as from every other disorder of the lungs. We have previously stated that probably fifty per cent. of all consumptives in this country, are cases of chronic pneumonia; and we should say that from thirty-five to forty per cent. suffer from tuberculosis; the rest, from ten to fifteen per cent., exhibit the other forms of the dreaded disorders known under the general name of Consumption. Men of great experience in post-mortem examinations, have asserted that seventy-five per cent. of the civilized human race exhibit tubercles in the lungs. We are not able to affirm the entire correctness of this statement, but should not consider it an exaggeration. There are but few post-mortem examinations made, in which tubercles would not be found in the apices or points of the lungs; and this fact has been regarded as incontrovertible proof that the disease was inherited — that these inherited tubercles, the tubercular noxa, was capable of being hidden in the lungs from birth, to spread and break out at some future time. And hence, also, the ready deduction — its absolute incurability; and the more so since all speculation and experiment in reference to its eradication or cure, have proved to be failures.

Hard bunches, or knots, were first discovered in the lungs of consumptives, by Fr. D. Sylvius, which he called tubercles; but Morton was the first physician to study them more particularly; though it was through Bayle, and more especially through Lænnec, that this peculiar form of Consumption was brought to the notice of the world at large. Lænnec brought the existence, frequency, and danger of tubercles so clearly before the physicians, that, at one time, nothing but tubercles seemed to occupy their minds. New peculiarities were developed, and observations collected from all quarters, served to swell the literature on this subject to an enormous extent, while the difference of opinion, and the variety, or their appearances, puzzled the very best physicians. All the forms of Consumption were thought, or believed to originate, from tubercles, and consequently many contradictory statements accumulated, which made the subject so irksome to medical students, that the study of tubercles was thought to have ended, or at least postponed ad infinitum, for it seemed useless to waste more time or ink on the subject. As is generally the case under such circumstances, every professor in a prominent medical school had a theory of his own, which he upheld as the right one, and whoever could produce the most incomprehensible one, was thought to be the most learned, and consequently followed by leading physicians, until some one could produce another a little more incomprehensible, when the old would

be discarded for the new, and on which more speculations and money could be made. This was the condition of things at the time of our own medical studies, and continues, to a great extent, to be so now. While the majority of physicians admit that they do not know much about this subject, even some of the most advanced students of the present time, among whom we may mention Niemeyer, Villemin, and Waldenburg, with many others, confound this disorder with the acute miliary tuberculosis, so called, and of which we shall speak further on.

It has been long known that certain occupations, or modes of living, would seem to produce this disease; for example, almost all shoemakers and sewing-girls exhibit it more or less. The disease is at home in prisons, factories, and in fact everywhere, where close confinement is necessary. It is the disease of which most animals in menageries die, which is especially true of monkeys. Cows, and animals which are fed in dark stables, and deprived of free motion, also exhibit it. As previously stated in our history of Consumption, Indians die of it after they become subject to European comforts. As the result of this change in their habits of life, they no longer hunt for their living, and thus the usual exercise of their former life is neglected. And the more violent the exercise which these individuals were previously in the habit of taking, and by which the whole of the lungs had been brought into daily, and almost constant use, the sooner, and more dangerously, they become affected, *if at once*, or suddenly, they neglect their usual exercise, and the *full* use of their lungs. And this one fact has puzzled the student on this subject more than almost any other. The disease is more prevalent in large cities than in the country; in level countries than in mountainous ones, where it is comparatively rare — is but seldom met with in people who work out of doors: soldiers, travellers, sailors, hunters, etc., for instance; but is common with persons who live indoors, and are more or less deprived of free exercise; writers, clerks, bookkeepers, etc., for example; and it is but seldom that a sewing-girl, or a shoemaker, or other persons who are obliged to work in a position which compresses the chest, are free from it. We can easily observe, from these facts, that a neglect of the use of the lungs subjects people more or less to tuberculosis; while the opposite, the over-use, subjects them to pneumonia. But before proceeding to minute explanations, we advise our readers carefully to review what has already been said on the mechanism of respiration, and the general pathology of the lungs. We there learned that the lungs were composed of five lobes; the right having three lobes, and the left two. Of these five lobes the two lowest are the largest; the second of the left is larger than the second of the right, and the upper of the right is the smallest. We observe, not only from the construction of the lungs, but from one deep inspiration, that to breathe with the lower lobes requires no exertion, while to fill the lungs to the very points requires the full strength of the chest and neck muscles. It is, therefore, not difficult to understand, that while the lower, or under parts of our lungs are in constant use, we

use, or require the use of the upper points only occasionally, or as a reserve power in the case of emergency. Hence, if we neglect the use of the lungs at all, it must be these upper points, for we cannot omit the use of the lower lobes under any circumstances. It is now a peculiar fact of observation, that when a person exhibits tubercles in the lungs, they are always found in the points, or upper portions, where their formation begins, and from whence they gradually spread downward; while their formation has never been known to begin in the lower parts, ascending upward. Therefore, from these two facts, the intimate relation between tubercles and the neglect of the full use of the lungs is clearly apparent. It will be found that all the observations which have been made during a hundred years, and the occurrence of cases under very widely different circumstances, races, animals, climates, or occupations, show that not in one single case where tubercles have been found in the lungs, there has not also appeared a neglect of the full use of the lungs. The Indians die of tuberculosis, not because they receive blankets, pantaloons, and food, but because, having these, they give up their usual exercise, and instead of hunting deer, or fishing, we find them sitting in their wigwam or cabin, smoking, day after day, without any more motion than they can possibly help. People suffering from diabetes exhibit tuberculosis not because of diabetes, but because they become so weak and lame that they cannot any longer exercise their lungs in full. Women who are enciente do not exhibit tuberculosis, but often show the arrest of it; not because they are enciente, but because from necessity they are obliged to use the upper portion of the lungs, the free use of the lower lobes being interfered with. The reason why marine infantry exhibit it where land infantry does not, is because the marine soldier is confined, and deprived of his usual exercise, while the sailor, who is in the same ship, and lives in the same way so far as food is concerned, but gets plenty of hard work, never suffers from it.

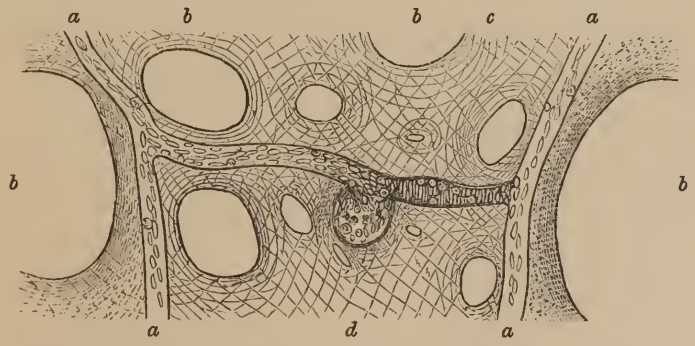
A perfectly healthy prisoner exhibits tuberculosis, not because the prison air is bad, but because he cannot exercise his lungs as freely as previous to his confinement. People who reside on low or flat lands show more tubercles than those residing among the hills, because walking on a plain requires but little lung power, while to walk up hill requires their full use. The famous pugilist, Tom Hyer, died of tuberculosis, not because he inherited it, or caught it, but simply because, from a continued and complete use of his lungs, he changed at once to the lazy life of an innkeeper; not only neglecting all the usual pugilistic exercise, but even his usual walking. We mention this case simply because it is one of the most striking of facts, showing that an absolutely healthy and immensely powerful person will be affected by tuberculosis as readily and more severely than the most delicate and weak one, and as the result or consequence of nothing but the neglect of free respiration. We therefore conclude *that tuberculosis is occasioned, and can only occur, in lungs a section of which is deprived of respiration, or where their use has been neglected for a length of time; and that*

tubercles originate only in those parts of the lungs which have been thus deprived of use, or neglected. And we claim that neither experience nor observation can show a single instance where this statement would not find ready application. We now proceed to illustrate and prove, physically and anatomically, the correctness of this statement: If we take an india-rubber tube, attach it to a force-pump, and force water into it to the full extent of its power of resistance, then, if the force be increased, it must burst, and, as a matter of fact, it would burst just at that point where its walls were the most defective, thinnest, or weakest, and the water would spirt out through the aperture with a force corresponding to the force required to produce the rupture of the tube. A process of this kind would somewhat resemble that of pneumonia. If we take a similar india-rubber tube, say of twelve feet in length, and, having tied up one end so as to make it perfectly water-tight, hang it up by the other end perpendicularly, and fill it with water, nothing will immediately occur; but in the course of time, a gradual enlargement of the tube at the lower end, or where it was tied, may be observed. The reason for this enlargement will be found in the fact that this particular part, or point, where the enlargement occurred, has to endure the entire pressure of the weight of the whole volume of water in the tube. The pressure occasioned by the weight of water in the tube is met by the pressure of the weight of the atmosphere on the outside of the tube. Hence the strength of the tube, in connection with the external or outside pressure of the air, constitutes the power which resists or balances the weight of water in the tube. But this power, which, unimpaired, is essential to a continued equilibrium, is composed of two factors, either of which is subject to change, modification, or removal. For were we to reduce, by means of an air-pump, the external or atmospheric pressure upon *one* point of the tube, we should thereby reduce one of those factors, the result of which would be the loss of equilibrium, and the consequent immediate enlargement or bulging out of the tube at that particular point. And were this atmospheric pressure still further reduced or removed, the tube would burst at this particular point, so as to admit of the escape of a certain quantity of water (proportioned to the external space or room admitting the flow), with a moderate force. Such a physical experiment would illustrate, somewhat, the tubercular process in opposition to the pneumonic one. The latter (the pneumonic), as we have already learned, is an active, and the former (the tubercular) a passive process. The difference between them is, that in one the action or power of resistance lies in the tissues themselves, while in the other they have nothing to do with it, but become a passive agent, and subject to circumstances.

In our anatomy and physiology of the lungs, we have shown that the motion of the blood through the capillary tubes, or vessels, is owing to respiration, and to respiration *only*. Therefore, if respiration ceases in any part, the flow of the blood must accordingly begin to cease. The nature of the blood is such, that as soon as its

course is arrested for a time in any part, it coagulates to a certain degree, and thereby obstructs its channels. The reason of this coagulation, in our opinion, is the arrest of the production of heat caused by an interruption of the free motion of blood-globules. The minute process of this cessation of circulation in the capillaries is, that the permanent collapse of the alveoles are followed by the permanent filling up of the meshes with blood-serum, which is not renewed or exchanged, and which gradually thickens. The circulation in the vessel itself would not become arrested at once, but, for want, or in the absence, of the pressure of the returning blood-serum from the meshes, would begin to slacken until the money roll accumulation of globules begins, and obstructs the channel. The more white globules there are in the blood, the sooner this will occur; for as these move on the walls of the vessels slower, they are apt to stop in their course if in excess. As soon as an obstruction has occurred at any particular point of a capillary channel, the pressure exerted by the weight of the blood, and the occasional congestion arising from quicker action of the heart, falls directly upon the walls of the vessel immediately before the obstruction, which accordingly enlarges on that part where it offers the least resistance, and finally breaks, permitting the escape of a portion of blood-globules from the vessel, which lodge in the meshes, where they remain.

A TUBERCLE is therefore composed of blood-globules, which have escaped from the vessels, and, being surrounded by the connective tissues, which, from the nature of their formation (into square meshes, as previously shown in the Anatomy), resist a further or greater escape of blood. The accompanying cut — a schematical view of tubercle formation — will, however, better illustrate this process to the eye, and especially if compared with the cuts previously presented on the mechanism of respiration.



a, a, a, a. Capillaries showing the circulation of blood. *b, b.* Alveoles, partly in a condition for respiration, and partly collapsed and debarred from use. *c.* Place where the money-roll accumulation occurred and obstructed the capillary vessel. *d.* Escaped blood before the obstruction—real or primary tubercle.

We notice the red blood-globules in the middle of the unobstructed vessels, and the white ones on the walls, while in the obstructed vessel, more blood-globules have been gradually forced in and become compressed or packed. The cut represents the time previous

to complete stoppage in the obstructed vessel, which gradually becomes solid. The greater part of the blood-globules are pushed back again into the unobstructed vessels, the others which are caught in the coagulating fibrin become destroyed by gradual pressure, and their liquid reabsorbed, while their hulls remain, and serve to paste or cement together the walls of the vessel. Thus the vessel becomes destroyed, and formed into a solid fibre, which gives that peculiar coarse appearance to the tissue which is always observed around tubercles. The completely incarcerated blood-cells in the tubercle undergo the passive degeneration into pus cells, afterwards into fat cells, or they shrink and become calcified, or they putrefy and decay. It is also possible that in isolated tubercles, reabsorption of the contents of the globules may occur, provided the surrounding tissues are again brought into use before degeneration has commenced; this, however, is but seldom the case, as the tissue almost always remains inactive from neglect of use by the patient. The degeneration begins by the blood-cell throwing off its pigment, and coagulating its solid contents when it appears cloudy. The coagulated solid appears somewhat like nuclei, and has been mistaken for such by many pathologists; but it requires but little acute observation to see that the form is not regular, but edged and irregular, unlike nuclei. The whole of this process gives to the tubercle a gray and opaque appearance. After a while the cells, through loss of liquid, become edged and rough, until they present a rather indistinct mass, and are often found in pieces. The liquid and the blood-serum, being in a condition more or less decomposed, irritate and poison the tissues and the circulating blood when in contact with it, by oozing through; therefore, after acute tubercle formation, we always observe a higher and irritated circulation (fever), which is more or less severe. If now the blood is rich in fatty elements, all cells, or at least a part of them, undergo the change into fat cells; or, if the cells are already destroyed, a mass of fat bubbles is observed in the tubercle, the slightly yellowish appearance of which (occasioned by the fat bubbles) becomes more and more marked. In this condition (fatty degeneration of escaped blood-cells), the tubercle may remain for a long time. On the other hand, if the blood is rich in phosphates and saline matter, these will be deposited around the escaped blood-cells, gradually forming a hard, whitish-looking crust — the calcified tubercle — which undergoes no further change, and is harmless.

But where the blood is poor in fat and in salts, the escaped blood-cells are apt to undergo putrid decomposition, being dissolved into a mass of thick and offensive-smelling liquid; and when this occurs, such mass corrodes everything around it, infects the tissue-cells and other blood-vessels, causes the blood to coagulate, thus producing obstructions in other parts of the circulation, thereby causing the formation of new tubercles everywhere, until the glandular system of the whole body is strewn with them. This is acute miliary tuberculosis, and will be treated of hereafter as a form in itself. It is not a primary disorder, being always secondary, can be produced

by inoculation, and follows the most widely-different primary disorders.

From this process of primary tubercle formation, it will be seen that its course depends very much upon the general condition of things, and may become arrested at any time, or take a quicker and more serious form. The power of governing or of arresting the tubercle process, lies in the correct understanding of these changes and conditions; and it does not require a very large amount of intelligence to see, that in any case of tuberculosis, the object of treatment is the production of the calcareous degeneration. The reason why tubercles very often heal of themselves, or their process becomes arrested without medical aid, may also be easily comprehended—it being the result of accidental or fortunately favorable circumstances, under which the patient may have happened to fall. But for the better understanding of the whole subject, it may be as well just here to give in a somewhat general view the symptoms and consequences of this form of the disorder.

From the fact that primary tubercles originate in a part of the lungs which is not in use, and comparatively outside of the general and ordinary operations of the body, no symptoms are experienced by the patient that would seriously alarm, or even draw his attention to the lungs. That would be the last thing he would think of. Hence it is very seldom that a physician can trace the disorder back to the time when the formation began, and therefore very improbable that a physician would observe and study a patient at such times. For while we may suppose that in most cases these patients have some symptoms sufficiently marked to notice them, it would be found, on observation, to be either a disinclination for food, a slightly disordered digestion, or an inconsiderable rise of the pulse, with an occasional sensation of chilliness. At this time or period of the disorder no cough occurs, nor is there any other sensation, either in the throat or in the chest, because such symptoms are only experienced when the disorganization has reached a point in the lung where respiration is still going on. But the patient will first notice something in his respiratory apparatus from the moment disorganization has reached the point just indicated, the character of which is generally more a peculiar sensation, than a real noticeable symptom, and in most cases with a tickling in the throat, occasioned by reflex action of the nerves, which is caused by the atmospheric air coming in contact with the diseased part, but not sufficiently marked to alarm the patient. But after a while this tickling, from its constancy and resistance, becomes annoying, and a great susceptibility is experienced to what patients call "taking cold." This susceptibility to cold, is occasioned by a latent and constantly feverish pulsation, with a slight increase of bodily heat, so that the smallest change or variation of temperature is felt by the patient. Some difficulty in digestion is occasionally noticed, which, however, is attributed to "cold," or something else, rather than to the real cause. Gradually patients begin to look a little pale, but frequently with red cheeks, and a real fresh look; they lose flesh slowly, but steadily. Not-

withstanding these warnings, which are already becoming strong, no one considers them sufficient to occasion alarm. Change of weather, dampness, or winds, etc., must account for the little "cold." In this way patients proceed, in the full consciousness that something ails them, but without the knowledge of what, nor can any one tell them. A little doctoring is here and there employed, or a voyage is undertaken, by which the patient is improved, so as to feel quite well again on coming home. In this stage of the disorder it not unfrequently occurs that patients become cured in consequence of some incidental or fortuitous circumstance or event, such, for example, as the late American war. Men who enlisted and went into the army in this condition, soon became obliged to endure difficult and laborious exercise in the open air, to change their diet, and to bring the entire power of their lungs into full operation. Such persons, when killed in battle, have been found, upon autopsy, to exhibit completely arrested or calcified tubercles in their lungs; an observation which has been made by many surgeons in the Army. From similar results observed, though under other circumstances having the same tendency, travelling gained a great reputation for consumption, and finally the climatical theory was originated, now so strongly adhered to. It was very natural when a patient happened thus to become cured, that he would speak of it, make it widely known, and advise others to the same course; and hence large numbers of unfortunate patients immediately follow him, but being entirely ignorant of the facts in question, do so, for the most part, to their great disadvantage. The Pyrenees, the Alps, the plateaus and hills of Peru, Chili, Mexico, California, and many other places, have thus gained their reputation. Physicians would send their patients to some one of these places, and, as a matter of course, if *one* returned in better condition than when he started, the newspapers and Medical Journals were full of the wonderful "*cure*." But we never read about the other cases where no benefit has been derived, or, as we call them, the great army. By far the largest number of these patients do not happen to come under these fortunate circumstances for cure, but pass on in the slow but sure road to the grave. The first symptom which really awakens alarm in these patients is the raising of a little blood, which is usually accompanied by a feeling of faintness to a considerable degree, and of fright. Sometimes they perspire freely at the time. The doctor is now immediately sent for; the usual arrest of the bleeding (which in itself amounts to nothing) is soon accomplished, and in a day or two the patient is about again. He is advised to be "very careful," but as to *what* he does not know. In a short time blood is again raised, or the raising of phlegm is observed, and the patient begins to try all kinds of doctoring, becoming more and more alarmed, and in the same degree worse and worse. He is examined, and his friends know that he has "*the Consumption*." He gets cod-liver oil, hypophospates of lime, or potash, whiskey, balsams, opiates, acids, arsenic, iron, etc., etc., and is sent to different places for change of air, climate, etc., but without any lasting result. He feels better to-day, while to-morrow he is quite discouraged. In his own opinion Bronchitis is all that

ails him, and this he tries to get rid of. He undertakes the most senseless cures, and means of cure; for example, such as the arrest of his cough. But after a while, through the gradual loss of the power or force of the sympathetic nerve, night-sweats occur, which the patient or doctor checks by the employment of acids (mineral), only to reappear again, a little more severe, or unfavorable,—to the disadvantage of the lungs. In this way patients often linger along for years, gradually getting worse and worse, according to the favorable or unfavorable circumstances under which they may happen to come.

In addition to bronchitis in the lungs, there now occurs larger escapes of blood into the tissue; the formation of tubercles gives way for worse and greater degeneration; from the overuse of the lung remaining sound, acute pneumonic patches appear, cavities form, and, in time, these lungs exhibit all the different forms of lung disease possible, one form following as the necessary result of the other. General blood-poisoning, or acute miliary tuberculosis, which is accompanied either by cerebral symptoms or diarrhœa, with very high pulse, heat, or night sweats, usually makes an end of the thing. There are a great many other symptoms which accompany this disorder, but are not, however, always equally prominent. For example: the dark bluish color of the finger-nails, which are occasionally badly shaped; the shoulder-blades which almost always become fixed, and stand outward, like a pair of wings; the lips of the patient have a bluish tint, or are pale; the skin pale, with occasional rose-red cheeks; the eyes have a peculiar look, from the loss of fat behind them; in females, the catamenia next becomes arrested (though not always in every case), generally from want of normal blood or nervous force, and very seldom from tubercular infiltration; pains in the back and loins are a common symptom; the appetite varies very much; some patients devour great quantities of food, others are the very opposite, and eat very sparingly,—this is owing to the sympathetic nerve and the digestive glands generally being more or less affected.

All of the above-named symptoms are of little or no value, however, to the physician, for his ear tells him immediately what the matter is. A finely educated ear will detect tubercles long before the patient is aware of anything being the matter, and before percussion would indicate any difference in resonance. The appearance of a little retained expiration, or in any way a slow and hearable expiration under the clavicles, is the sure sign of tubercle formation. There is at first no crackling, which appears later, as if hair was rolled between the fingers; but any one with a good ear, after hearing it several times, could know the peculiarity of it without being able to describe it exactly. The reason for this variation in expiration is the irregular passage of the air in the neglected bronchi; and the crackling, which appears afterwards, is caused by the arrest of the motion of the hairs of the epithelium, which is owing to the formation of tubercle directly near it. If percussion already gives a distinct variation in resonance, the case is one of already advanced stage, and is dangerous under the best of circumstances, though the patient may not know or be aware of it.

Disorders of Capillary Blood-Vessels.— Tuberculosis — *Con.*

THAT tuberculosis is inherited, in most cases, is an opinion which has been adhered to from the first; and to prove the correctness of this view, a great many statistics tending to show the prevalence of "Consumption" in distinct families have been recorded, some of which would *seem* to be almost conclusive. But since we have learned what a tubercle is, it is easy to understand that such a *process* cannot be inherited. We must, however, admit that there are families which have a very delicate blood-system, and are therefore more easily subject to injury than others; for example, families which are subject to bleeding, etc. But it should not be forgotten that in particular families there are certain habits which are peculiar to them — the father's habit of sitting and walking in a stooped or bent over position, the sons or daughters, most likely, will accept as a family characteristic. In some families dyspepsia is so prevalent that every member is a sufferer; but the cause will be found in the rich or indigestible food eaten, and in such habits as *must*, in the end, injure the intestinal canal. Again, some families are in the habit of sleeping in a very bad position, with high pillows, so as to compress the chest, and thus prevent free respiration during the night; and if this position becomes habitual, the foundation for tuberculosis is laid. The cases which bear most strongly in favor of the inheritability of Consumption are those where children have grown up apparently well until pubescence, when they at once show signs of tubercle formation. But, as previously shown under alveolar disorders, all these cases are occasioned by *infantile* atelectasis. Certain groups of alveoles were *never* extended, and therefore could not exert any pressure upon the surrounding blood-vessels, and consequently stoppage of circulation in them must finally occur. The reason why such children do not exhibit tubercles sooner, is because their previous habits are of a character requiring the use of the lungs to an extent which does not admit of the enlargement of the vessels; but as soon as they become young men or ladies, their habits naturally change: they become more quiet, dignified, and what is termed mannerly; and under these changed conditions the consequence of neglect in their earliest use is manifested. It is so absolutely necessary for parents to know and fully comprehend this fact, that we cannot too earnestly recommend and urge upon them the all-important duty of seeing that the lungs of their babies are *fully extended* in their earliest infancy and childhood, and thus save them from a sickly, wretched, and comparatively short and useless life. Let any one who takes an interest in the numerous cases of atelectasis among children, watch the girls of any given school as they pass out from their school-room on a summer's day. The necks of all, or nearly all, being uncovered, they

can, almost without a single mistake, pick out all those who have atelectasis, and are ripe for Consumption. In a normally developed child the collar-bone should be just visible to the eye; but in some girls it will be observed that their collar bones stand out an inch, or even more, over the ribs, which indicates, pretty certainly, a case of infantile atelectasis. We have found that from thirty to forty per cent. showed it more or less. In most cases the defect can be very much helped, and a further progress of injury avoided, by proper attention and management. When the Romans invaded Germany, they noted the dipping of their newly-born infants in the river by the German women as one of the greatest of barbarisms. But among the Germans at that time tuberculosis was unknown, while in Rome it was quite prevalent. Now, children are washed in warm, if not in hot water, filled with milk, and rocked to stupefaction; and if this does not have the effect of keeping them quiet, they are dosed with paregoric or soothing syrup, which is sufficient to make a strong child liable to atelectasis, and consequent tuberculosis. But what is to become of children who are born of weakly parents, and require artificial stimulants to breathe at all?

Another and early-laid cause of a tendency to tuberculosis is vaccination with impure lymph, or with any kind of dead or diseased blood or pus-cells. If in the process of vaccination it so happen that a blood-vessel is pierced, and one or more of such cells passed into it, they are carried along in the blood stream, get caught in the next lymphatic gland, and obstruct the free passage, when the gland soon begins to show signs of inflammation, and undergoes the so-called "cheesy degeneration" (so called from its similiarity to old cheese), a process which was formerly known under the general or wholesale name of scrofula. The writer has examined vaccine lymph under various circumstances, and from various sources, and has found but *one* specimen which was entirely free from dead or morbid blood-cells. This specimen was from a gentleman who devotes a great deal of time and attention to vaccination, and who had procured it from a young heifer. If any one who possesses a microscope having a power of three hundred diameters will procure some vaccine matter and examine it, he will never thereafter consent to be vaccinated with matter in which he has detected pus-cells, that is if he knows anything about blood-poisoning. But if vaccine lymph contains no cells, it may be used without danger or injury to the patient.

Among English and American physicians the view is very prevalent that tuberculosis is contagious; and there are a large number of cases on record going to show the correctness of it. But if we consider the care and attention a consumptive patient requires of the attendants for months, or perhaps even for years, it is not a matter of surprise if they sometimes break down under it. It is also possible that such attendant may have had a wound or an ulcerated mucous membrane, and as a consequence have been acidentally inoculated with the pus-cells coughed up by the patient; but such, however, would be only an uncommon occurrence. The disorder as

such is not, and can in no way be, contagious, because it is a physical process, and therefore cannot be transmitted.

The medical profession, since Lænnec, came to believe that tuberculosis was absolutely incurable. After everything had been tried that came within the range of medicine, and always without any result, the curability of tuberculosis was given up. At the time when the writer was engaged in his studies, it would have been as ridiculous to speak of curing tuberculosis as it would now to speak of moving the Rocky Mountains into Eastern Canada. The first who distinctly stated, from actual proof within the body, that tuberculosis is absolutely curable, was Dr. John Hughes Bennett, of Edinburgh, Scotland. (Pathology and Treatment of Tuberculosis, Blanchard & Lee, Phil., 1854.) Then several other physicians, one here and there, began to demonstrate its curability by nature; but apparently no one could comprehend or understand that in each case it could invariably be accomplished by art.

One of the most peculiar facts known to the writer is, that Bennett, who shows very plainly that tubercles heal by "calcareous deposits," as he himself says, should have failed to think of imitating nature in this process, and, instead, recommend cod-liver oil, of which he knew very well that it contained no lime, and that it could in no possible way aid in bringing absorbed or assimilated lime to the parts requiring it. When the writer saw how nature healed tubercles by calcification, or limy deposit, it at once occurred to him that nature should be imitated, and the body forced to do in each case what it does naturally in some particular cases. The idea, however, was much easier to conceive than to carry into actual practice. It became apparent that the lime to be deposited in and around tubercles must be carried there by the blood in its circulation; and consequently, as the first necessity in the case, the blood circulation around the diseased parts regulated, or re-established, before any deposition of lime could be effected. The absolute correctness of this view has been proved in every case during a practice of fourteen years. But it was apparent that this object could be accomplished *only* in accordance with the general rules relating to other parts of the body, namely, pressure. How to procure this pressure upon the lung tissue was the difficulty. This idea, however, led to the discovery of the fact that the nitrogen of the atmosphere constitutes the power for pressure in the lungs, as the muscles constitute it in other parts of the body. The correctness of this view was afterwards proved, through actual experiment, by the late Prof. Graham, of London, who showed that the nitrogen could be separated from the oxygen by filtering. (See *Scientific American*, May 1, 1869, page 279.) Consequently the application of this pressure to the lungs could *only* be made through a method in respiration by which the air was forced into and between the diseased parts. This being accomplished, the next object was to bring the blood into such a condition as to contain the necessary salts for deposition. For this purpose perfect digestion was indispensable, and then a diet arranged so as to furnish the necessary material for

the blood. By carrying these views into actual practice, the writer has invariably succeeded, in every case, in effecting the arrest of the tubercular process in the lungs. The great danger in connection with advanced patients is complications with, or better, the secondary existence of, acute miliary tuberculosis, so called, or general blood-poisoning; the consequence of which is the occurrence of obstruction of circulation in the lymphatic glands, of the intestines, or of the brain, thereby making the case hopeless; although we have seen recovery from the affection of tuberculous deposit in the brain; and Waldenburg has observed the recovery in animals, as we shall hereafter learn. In every case where this fatal complication does not occur, we affirm the possibility of the arrest of the degeneration, in which opinion Bennett and many other observers coincide. The method of treatment which we employ we shall endeavor to explain to the comprehension of the reader, although we must defer the minute scientific exposition of the dietetic rules to a separate treatise, comprising, as it does, a vast study in itself.

The restoration of circulation by means of complete respiration may seem, at first thought, a thing easily accomplished. But its practical execution with consumptives, having a view to a correct result, not only requires much consideration, but in private practice is attended with many difficulties, which, though of but little importance theoretically, are often practically almost insurmountable. The use of considerable force is necessary to press air into the diseased parts; but if too much pressure is employed, or too suddenly, we produce congestion of the diseased, and are in danger of causing emphysema in the healthy, parts. With consumptives, the action of the heart is raised to fever height by a slight degree of irritation, the direct consequence of which is oppression and shortness of breath. We cannot force the air into the apices, or upper parts of the lungs (and in the achievement of which the result is reached), by inhalations excited by the will of the patient alone; nor can we employ artificial pumps, or inhaling apparatus, because by such passive pressure the air would not only not enter the obstructed bronchi, but force more mucus and blood into it, while too much pressure would fall directly upon the lower parts of the lungs, where we do not care to have it. We require to employ a process by which the air is gradually permitted to enter the obstructions. This we accomplish by using the muscular force of the chest in such a way as to employ those muscles, which, by contraction, enlarge the upper part of the thorax, and thus produce the effect desired. Before any attempt of such procedure can be made, however, the physician must be certain that no acute inflammatory process exists in the lungs. In all cases where such process exists, the patient must first be brought to bed, and the acute inflammation removed. But if the lungs are free from an acute inflammatory process, we proceed at once to instruct the patient how to begin. The muscles of the chest of these patients are invariably torpid, and very weak and lax; consequently we have to proceed very gradually. By simply bending forwards and backwards, if done very slowly, a deep inspiration, deeper than the

patient can make by will alone, may be produced. The different rotations of the humeral joint, in connection with the above, will be productive of a still deeper inspiration, *without raising the pulse*. This manipulation must be performed with a machine-like steadiness, the mouth open, and without any interruption of respiration. All, or nearly all, beginners hold their breath at first, which is a mistake. When the patient has advanced a little, and his muscles allow the use of more power, he is directed to take a position in the corner of the room, to raise both arms to a level with the shoulders, resting them upon the walls, and to repeat the bending. This is much more severe than the former exercise, and deep inspiration follows it. The patient having learned this, he is next instructed how to bring all the pectoral muscles into action for extension at once. This is accomplished by one arm at the time being turned, in a straight condition around the chest, the body being bent as the arm rotates. This exercise is very hard at first, and is the most powerful. It requires from two to three months to accomplish it. Then we employ the corner exercise, in a horizontal position, between two chairs. This is so very difficult, that persons in health, trying to imitate it, invariably fall upon their nose, and yet consumptives learn it without difficulty; it is only a matter of time. The patient, having finally learned this difficult exercise, is safe, and has acquired a power that is astonishing, both to himself and to others.

The invariable effect of these exercises in the beginning is a severe pain in the pectoral muscles, and from experience we can affirm that the more severe this pain is, the better the case promises. The next symptom which follows is a more profuse expectoration, which usually, from lack of a knowledge of its necessity, alarms the patient. We have had a number of patients who could not be induced to go on, simply on this account. When there is no pain in the muscles as the result of these manipulations, and the expectoration does not become more profuse, the case is a hopeless one — the patient is lost. The cough very soon changes from a hacking to a deep pectoral cough. It not unfrequently happens that patients raise little streaks of blood, but this does not interrupt the exercises, and is really of no consequence. We have not only never had the occurrence of bleeding, but often arrest of severe hæmorrhagia by deep inspiration alone, when all medicines had proved useless.

These exercises should be repeated from three to twenty times a day, according to the general condition and power of the patient. All other exercises with clubs, or dumb-bells, running up stairs, walking long distances, or walking too fast, fast driving, riding on horseback, dancing, singing, disputing, etc., are strictly forbidden, for they invariably raise the pulse of the patient, while the exercises above described, when properly executed, do not. The pulse should never, under any circumstances, be raised more than ten beats.

These gymnastic exercises are alternated, or interchanged, with gentle walking out of doors in any kind of weather, except when strong winds prevail. Sunshine or rain, heat or cold, snow or easterly winds, have no injurious effect upon the patient. We have never

known one to take cold, or to be affected in the smallest degree from this source, during our whole professional life, and no respirometer, chest protector, or extra protection of any kind against cold air out of doors is ever allowed. The regulated circulation in the chest makes all this unnecessary. The next greatest benefit arising from this treatment, is the night rest it secures. Patients who have not slept soundly for months, under the use of morphine and chloral, again enjoy their natural sleep without interruption. Strange as this may seem, it is nevertheless an unfailing result. With these simple and inexpensive means, and for every patient, the incurable as well as the curable, everything is gained or accomplished simultaneously, or at the same time; which change of climate, voyages, artificial apparatus, inhalations, or any other procedure, accomplishes only in part, or not at all.

Persons who are sick make an invariable mistake, and one which will probably continue to be made, by endeavoring to remove *symptoms* which give them direct notice of disorder. A man, for instance, who has an ache, seldom or never thinks of the cause, and is only anxious to have the pain removed, no matter how; or a person suffering from diarrhœa will immediately try to arrest it, without knowledge or reference to cause and effect. But in no disorder is it more common than in consumption, to observe patients trying again and again to subdue or to arrest their cough. This seems to them their greatest trouble; and if they can find anything, or anybody, that will arrest it, they are delighted. And yet this is the very worst thing that can possibly be done. The cough is the most powerful attempt of nature toward recovery, and without which no patient could ever get well. Cough, in consumption, is what fever is in blood disorders, or the discharge of pus from a wound; it is the alarm-bell, as well as the means by which diseased and decayed parts of the lungs are removed, and room made for air and for life. If a patient suffering from tuberculosis succeeds in arresting the cough for a time, he thereby forces secondary tubercles (acute miliary tubercles) to appear in the lungs, and, finally, all through the glandular system, making his death, in the end, a very painful one — dying, by gradual suffocation, in full consciousness. On the other hand, if the discharge from the affected lung is not prevented by arrest of the cough or otherwise, and the case is of such a character as to make the arrest of the process impossible, death will come unconsciously, without pain or struggle, like a person falling asleep. Instead of being suffocated, as in the former case, they die from the arrest of nervous power. The exercises recommended are, therefore, valuable in incurable as well as in curable cases.

The next necessary object to gain is a complete digestion — the most difficult subject in medical science. It consists of four distinct features: 1. The solution and preparation of food, so as to render it capable of absorption; 2. The absorption of food into the blood; 3. The digestion in the blood, blood metamorphoses, or the changes which support life; 4. The excretion of the cinders left by this process, the expulsion of all material which has rendered its service and become unfit

for further use. In the exact proportion as this process goes on, regularly or irregularly, a person is well or unwell. And in the exact proportion as we may be able to regulate or moderate this process in those who are sick, we restore the patient fully, or relieve him partially. The cure of consumption, or any other disease, *depends wholly and absolutely upon this point*. For the regulation of this process, nature has given us the sense of taste and smell. A man living wild, or an undomesticated animal, never makes a mistake in diet, because they use their senses in full, while civilized man does not. The sense of taste, especially, is utterly spoiled, vitiated, or mutilated through the customs, habits, and modes of civilization, or otherwise disease would not exist. As with the mechanism of the chest for respiration, etc., so also with the mechanism of digestion, we appeal to, and follow, nature. The first thing we try to regulate is the *taste* of a patient. It will be found that all patients have a decided craving for certain things, though sometimes unconscious of it through the use of medicines; but soon recover their natural instinctive taste if let alone, or if nature is allowed to develop its powers. This we say is *invariable*. It is also invariable that as soon as the natural taste is appealed to, the patient craves what his blood is in need of — not that he would always hit the exact thing that should be introduced, but the nature of his taste will be in that direction. For example, a patient craves pickles. He does not really want the pickles, but the acid. His blood is over-charged with fibrin, or half-formed or half-used-up composition of that nature. The physician, knowing this, has simply to select the most suitable acid under the circumstances. Or suppose the patient craves salt fish. He has generally an excess of albumen or albuminous matter in his blood. Or if the patient craves both pickles and salt fish, which is the case with most consumptives, he needs both acid and salt. If a person has a surcharge or excess of albumen, he will dislike eggs exceedingly, while if he needs albumen, he craves them. Or perhaps we find a patient craving odd and wholly indigestible things, such as lead, or slate pencil, chalk, etc. His blood is in need of lime or iron, or other minerals. A patient craves onions, horse-radish, or the like, sulphur is wanting; if potato is craved, potassium is most likely needed; or starch, or sugar, equalling a want of fat. It very often occurs that the patient cannot express what it is he wants, but in a few days will stumble upon something which leads the thinking physician to the knowledge of what is needed in the economy. This is the scientific way of treatment, and the *only* way to reach the desired point; no other means exists by which the physician is enabled to discover the true condition of a man's blood. After having reached as nearly as possible the approximate condition of things, we have to consider three points: first, what are the best materials to ordinate under the ascertained circumstances; second, how can we obtain the required materials in the best form and quality; and third, how prepare or cook them so as to be most readily absorbed and digested.

This is very easily read, but sometimes exceedingly difficult to

execute. To nourish a healthy person is certainly easy enough; but to feed a patient and *make* the food digest, when the stomach and intestinal canal have been chronically inflamed for months or for years, coated with thick mucus, with nerves almost paralyzed; who is obstinate and fretful, having neither vigor, endurance, or patience; whose family or attendants have no idea of cooking, and less of digestion, and often bare of common sense; with friends who interfere with their advice and experience in quackery; servants or cooks who are either unwilling to take the trouble, become careless, or purposely do things wrong; is a very different thing, the difficulty of which may be imagined. And when to all this, poverty comes in addition, as is too frequently the case, in consequence of which the patient is unable to procure even the urgent or indispensable things required, it will not be difficult to see that to control and reform a long-disordered digestion is no easy matter. Still the possibility of doing it is always there; difficult or not difficult, it *can* be done in each and every case of Consumption.

From the above it must be evident that a specific diet for consumptives cannot be given or prescribed for general application or use, each case requiring a diet of its own. Hence if we should select *one* case, and after giving the indications, and the required or needed course of procedure, we might thereby mislead others to imitate our directions just where it should be the opposite. A few rules, however, we can give as to *general* diet.

If patients require acid; lemon, grape, or apple-juice is the best that can be used. It is also advisable, in summer, to use lactic acid, by allowing milk to become sour. If salt is wanted, it is best to use salt fish that has been well cured, white, and not at all decayed. The Nantucket salt fish is the best we know of. Salt should be used moderately in substance; in salt fish it is easier to digest without acting too rapidly. In case there is a doubt as to what blood-salts are required, or mostly needed, the use of whey or milk is most to be recommended. Whey is made from fresh milk, where the casein is separated when boiling by lemon or other acid. If fat is to be introduced, fresh milk should be drank. The use of milk in large cities is, however, very dubious, as most of it offered for sale is bad. Cows that are fed on bad food, never allowed to exercise out of doors, and kept in dark stables, give a milk which is absolutely poisonous for continued use. Cows for invalids should be kept in summer in open pasture, where there is good grass; and in winter should be fed on hay, clover, beets, carrots, and grain, and have access to salt and light. They should also be new or fresh milkers; that is, their calves should not be older than from one to four months. When good milk cannot be procured, fat, if needed, must be introduced by other food. It can be given in salad, as oil or good butter, in substance, or in gravies well dispersed without the use of flour or tallow. Pork, when fed on grain and acorns, and brought up *free*, unconfined, and not in pens or stalls, is excellent; if otherwise, abominable. Ham procured from animals that have been well brought up, cured in cold smoke, and eaten raw, is excel-

lent in some cases. In other cases it is better to give more starch or sugar, for preparation of fat *in* the body itself. Honey, in some cases, is also excellent. The rule we have given relative to feeding and raising pigs, applies with equal force to geese, ducks, and fowls, or to poultry in general. Lard or lard oil is always bad for use.

For beef and mutton we try to select only from healthy animals, and, if possible, from those which have been killed by Jews, as their mode of killing frees the meat entirely of blood, and they examine the health of animals, which is important, especially with mutton. If an animal has not been fed well, or is in any way sickly, its blood is the most affected part, and therefore it is wise to free all meat from blood as much as possible; but if the animal is absolutely healthy, the blood is not hurtful. It is, however, safer, when killing an animal for food, to cut its throat than to knock or strike it on the head. In a general view any kind of meat is useful as long as it comes from a healthy animal, that had freedom relative to its wants. Therefore game is generally the best of meats, but requires to be well cooked, as sometimes the meat contains the eggs of parasites. Next to meat, fish is very useful. In selecting fish, the quickest should always be preferred, and absolutely fresh. Some fish are poisonous at their spawning time. Lobsters and oysters also form a very good addition, if fresh, and properly served up. In some cases of absolutely bad digestion, when nothing can readily be digested, the use of raw beef has to be resorted to. This is prepared in the form of a salad, and tastes very nice if properly done. Meat with salt alone, if in good proportions, is very palatable with or between toasted bread.

Vegetables for invalids should always be such as have grown in the reach of the sun. Vegetables grown under the ground are less valuable, because the chemical action of the sun renders the contents of all edible plants more perfect and healthful. Celery, tomatoes, lettuce, the dark-colored cabbages, kohlrabi that grows over the ground, peas, beans, asparagus, cauliflower, etc., are mostly to be preferred; and from those which grow under ground, onions, radishes, and horseradish are useful, on account of the sulphur they contain in a very easily solvable form. For a similar reason mustard should be used, if craved by the patient. Potatoes, turnips, beets, squash, cucumbers, rice, starch, tapioca, although useless for diet, can be eaten occasionally without injury.

The use of fresh acid fruits is very necessary; such as lemons, oranges, grapes, apples, stawberries, raspberries, blueberries, and the like; peaches, pears, cherries, and similar fruits are not good; bananas, raisins, old nuts or almonds are bad. Fresh, sweet (not rancid) nuts are, however, very good.

The use of good pickles is sometimes allowable, and so also are very good and properly made pies, very good cheese, very good puddings not too rich, ice-cream, preserved fruit, and sardines. But the following are *always* forbidden: old animal fat or oil, rancid butter, tallow, doubtful cheese, hot bread, cakes, or pies, tea, coffee, chocolate, cocoa, wine, beer, liquor, or stimulants of that kind;

candy, peppers, excessive use of eggs, potatoes, the same fare every day, or the same meals in repetition, fat soups, preserved meats, meat extracts, malt extracts, or anything of that kind. Bread should be made from a mixture of rye and wheat flour, not too finely sifted, well-raised by ferment or yeast, and thoroughly baked. It is also well to change the kind of bread, using Graham, brown, white, and mixed bread. Good sweet butter can be used at any time.

The cooking of things so as to be at once palatable and easy of digestion, is a great and important point. We cannot here, however, go into the details of cooking, as this is an art in itself, but as necessary for the treatment of invalids as the knowledge of the nature and use of medicines is to the physician. In some cases the use of water containing carbonic acid is useful.

A patient with Tubercular Consumption should be managed in the following way: he should sleep upon a hard hair mattress; covered so as to be comfortable, not too cold, nor yet warm enough to induce perspiration. Provision for a free and regular circulation of fresh air through the room, should always be made. The patient should sleep with his head only slightly elevated above the level of his body. He must rise as soon as he awakes in the morning, and should be taken at once into a warm room, and rubbed off with a coarse towel dampened or moistened with sea-water, or a solution of rock-salt, then dressed by the help of an attendant; and after having taken a glass of cold water (or mineral water if prescribed), go through the required exercises. He should then rest for fifteen minutes, after which he may take a very light breakfast, consisting of bread and butter, oatmeal pudding, cracked wheat, boiled fish, or something of a similar character, No meat or warm drink should be allowed. After breakfast the patient should rest for half an hour, and then take a walk out of doors. He must go out in all kinds of weather, only when a strong wind prevails, must avoid walking *against* the wind; but when obliged to do so must keep a handkerchief over the mouth. His dress should not be different from a person's in health. After the walk (from ten minutes to one hour) he should rest, lying down, and then repeat the exercises once, or as many times as prescribed; followed by rest again, with such amusements as can be had without excitement, displeasure, or anger. Then comes the dinner, consisting of some good meat, good vegetables, bread, and fruits afterward. Under no circumstances should there be liquid of any kind on the table, but the patient can drink as much water as he pleases before or after the meal. After dinner the patient should rest one full hour, and then take the exercise again, followed by rest, and another walk as long as prescribed. After the walk, rest again, always lying down, then the exercises followed by rest, and then supper, consisting of bread and butter, milk toast, oysters, sardines, or a piece of good pie, and in summer-time occasionally of milk, etc., after which rest again, followed with amusement of some kind. Before going to bed (which must always be before ten o'clock) the patient should be again rubbed off, as already described, and make the exercises long enough to tire him all over,

and go to bed at once. After a coughing spell sound sleep will follow, and generally the patient, after getting once in tone, will sleep till morning, when another coughing spell, with profuse expectoration, will wake him up. If this management is followed regularly, the correct diet used, and the patient otherwise kept in an agreeable and happy condition, *any kind* of tubercular affection of the lungs will *invariably* and readily become arrested. We are so sure and certain of the effect of this treatment, that we unhesitatingly pronounce it absolutely *unfailing* in every case so far as the lungs are concerned. A patient, however, who has lost lung tissue to such a degree that large cavities exist, cannot be cured, since the lost tissue cannot be restored; but a new tubercular process will at once be prevented in the lungs in any case. We have had cases where the patient had several cavities as large as pigeons' eggs, and yet recovered so far as to do business again, and instead of leaving his family poor, accumulated a handsome property before he finally died of tubercular diarrhœa, which he induced by carelessness, thereby making his death sooner than it would otherwise have been. But when no tissue is lost, patients recover so entirely that in time they themselves begin to doubt of ever having been troubled with sick lungs, although the fact can be diagnosed at any time by percussion.

Before closing this chapter, we will mention, that after the digestion of a patient has been regulated, we employ such herbs or plants as contain lime. Prominently among these stands the roots of Triticum repens, or witch-grass, twitch-grass, couch-grass, etc. This weed is very destructive to farming, as it absorbs the phosphates, sulphates, and carbonates of lime from the soil; and for this very reason we use it as a medicine in the form of extract, or freshly-expressed juice. The plant standing next to it, in lime, containing properties, is Achillea millifolium, or yarrow, a weed which grows only in meadows where lime is prevalent. It contains a large amount of mineral matter, and has been a popular, as well as a professional, remedy for ages. Various kinds of thistles are also very useful, from their containing a large amount of silica and lime. The use of these and similar remedies support the calcification process very much.

Although the whole of this treatment, which we have named the *artificial calcification of tubercles*, is unfailing in its effect, and is *absolutely the only* means by which a case of tuberculosis can ever be arrested, it has the fault of being applicable only to a certain limit, especially in private practice. A man who is obliged to work in a shop for a living, or a clerk who is confined to his desk, or a seamstress who has to sew for a living, or a mother of a family who is under the necessity of washing and ironing to provide for her children, are incurable, not on account of their disease, but on account of their position. This is the only painful feature about it, and to the physican the more so, as he must often refuse treatment in such cases, where, while he knows he could cure the patient, cannot cure the patient's purse. The face of a poor man, after being told what he must do in order to get well, is more telling of human

misery than the works of Dickens and other novels put together, or all paintings that can ever be painted. And we would here suggest, that while millions of dollars are, as it seems to us, being thrown away, or given in support of useless objects, that some benevolent millionaire, or even the Government, should remember that an institution for the complete cure of incipient tubercular patients who are poor (though almost always very useful persons) would be a better work, and a greater human purpose, than hundreds of others which find the most liberal support. Let them remember the young clerk or similarly-situated person who, if he had only a few months' vacation, could recover his health and life, but without which must go the sure road to the grave, simply because he is obliged to work for his bread before he can work for his health and life. Everybody has seen it, must see it, can observe it every day. And yet the employer or his family, it may be, spend or devote large sums to alleviate the supposed misery of those of whom they know nothing. It has always been, and probably always will be, the fault of humanity to see everything that lies far away—the farther the better; that which lies the nearest—*our own* faults nobody cares to see. It is so in science, in politics, in religion, in benevolence, in words, thought and deed.

Disorders of Capillary Blood-vessels — Acute Miliary Tuberculosis.

ACUTE miliary tuberculosis, so-called, (blood-poisoning by pus-virus, secondary tuberculosis, acute, galloping or quick Consumption,) is a very distinct form of Consumption. The existence of very small spots in the glandular and serous tissues of the body were already observed in the seventeenth century; but Baillie, and more especially Lænnec, were the men who brought this subject before the world at large. They observed that in some cases of Consumption, the whole glandular system, and even the linings of the glands, were completely strewn with little gray grain-like spots, the nature of which, however, no one knew or understood. In 1843, Prof. Klenke published a book in which he declared that this form of tuberculosis could be produced, arise from, or be caused, by inoculation. But, as is usually the case, the fact escaped the notice of physicians and was forgotten. In 1865, Villemin astonished the world by presenting the same discovery to the Academy of Paris. His experiments were at once repeated, and found to be correct. His discovery is, that the inoculation with the pus or sputa from a tuberculous person produces acute miliary tuberculosis in animals. Waldenburg afterwards found that inoculation with almost anything, foreign, or decaying matter, such, for example, as cotton-wool, or any substance that produces pus by irritation, would produce the same effect. These experiments were the occasion of a renewed interest in Consumption, and a revision of the previously-existing vague and confused ideas on this subject, without, however, leading to anything definite or certain, either theoretically or practically. As in all previous discoveries, so also in this, the facts were made to do service with a view to explain what before was unexplainable, but, as usual, they failed to answer the purpose.

The simple fact is, that inoculation with dead or morbid matter is a very dangerous proceeding, which has been known since Hippocrates. But the exact manner in which the so-introduced matter becomes dangerous is a discovery made by Virchow: namely, that any solid substance, whether it be diseased or morbid cells, mineral, or particles of coagulated matter, is capable, by its own form, as well as by causing a coagulation of blood fibrin, of obstructing the capillary net of blood-vessels; and that these obstructions cause lesions of the vessels, which afterwards cause very small spots — the acute miliary tubercle. This process is scientifically called "embolism." It makes no difference as regards the substance by which this obstruction is occasioned, the effect is the same; but it will be readily comprehended that decaying organic matter so introduced is far more dangerous to the organism than mineral substances of a passive character. An inoculation with finely-powdered iron would obstruct a portion of the surrounding capillary vessel, and there stop; but an

inoculation with pus cells, or the like, would prove far more disastrous, as such cells would be carried along with the blood stream, get caught in the lymphatic or internal blood glands, produce infection of the tissue cells there, and, by continued self-inoculation, would result in death, or at least in very serious injuries. The practice of tattooing with zinnober or India ink, gives a practical illustration of the one kind of inoculation, and the inoculation with pus cells, vaccine lymph, as in vaccination, the experiments of Villemin, and all others, gives a similar illustration of the other kind. The first is harmless, while the latter is exceedingly dangerous for life. The discovery by Villemin is in reality nothing new, but simply and only a verification of the old fact, that the introduction of pus into the organism is followed by acute, dangerous blood-poisoning or miliary tuberculosis. Blood-poisoning also occurs by injection of any morbid liquid; and, although quite dangerous, is not, however, so absolutely hurtful and directly destructive, as the inoculation with morbid substances or cells or clots of putrefying fibrin.

For our purpose, however, we do not care so much for the consequence of the inoculation of pus, as for the self-infection which occurs in cases of pus formation in any part of the body. This self-infection occurs in the following manner: if, from any cause whatever, a process of decay or putrefaction goes on in any part of our body, and without the possibility of a free escape of the morbid matter, this morbid matter so confined, by filtering or oozing through and into yet healthy parts, injures the fine blood-vessels, and causes coagulation of blood therein, or, by corroding the parts in contact, comes into the general circulation, and thus constantly poisons, obstructs, and destroys the blood circulation in general. This process can therefore occur after primary tubercles, pneumonia, cheesy degeneration of a lymphatic gland, abscess in the brain, lungs, liver, etc., after pleurisy, or any other internal decaying process that admits of no free escape of the decaying matter.

This process, in its origin, seat, and general progress, differs very much from the primary tubercle formation treated of in our last chapter, although they appear alike to the eye, and undergo similar changes; and we here distinctly state, that the confounding of the two processes is a mistake not yet understood by the medical profession here, or in Europe. In no instance can it occur as primary, or begin of itself, but is *always* and *invariably* a secondary result of another and previous disease. It is, however, the most dangerous complication that can occur, and, with very rare exceptions, is fatal in its results.

The disorders which favor its appearance most are chronic pneumonia, pleurisy, and abscesses of the lungs or pleura; primary tuberculosis is more rarely followed by it, the process being too slow, and the primary tubercles remain in a more passive degeneration, or calcify, unless there are a large number of them together at one particular point, and so interfere with one another, in which case, as the disease progresses more and more, acute tuberculosis may also follow it in the end.

There are no direct or distinct symptoms by which the existence or appearance of secondary tubercles can be readily diagnosed with certainty, and the fact that it sometimes begins and by fortunate circumstances may arrest itself for a time, makes the diagnosis still more difficult. It requires repeated and continued watching and observation to ascertain its existence, and when ascertained, is the most unfortunate intelligence that can reach either the patient or the physician. In any form of Consumption, if, after the blood has been freed from morbid matter, and the pulse thereby reduced, we soon observe the pulse to rise again, in connection with increased abnormal bodily heat, and this process continues to repeat itself, then we anticipate acute or secondary tuberculosis, and pronounce the patient incurable or lost, although we have observed recovery in spite of it. Such cases of recovery are, however, only rare exceptions. According as more or less of the poisonous matter and its quicker or slower entrance into the circulation takes place, the pulse will be higher or lower. We have observed it as high as 180 per minute in adults. Generally, however, it ranges about 130, going down to 90 as soon as the blood is freed from poison, to rise again when a new escape of this deadly matter has occurred. In the beginning, the patient generally feels quite sick, has dull headache, vomiting, severe chills and fever, and appears very much as patients do who are sick with typhus, or the beginning of small-pox. Sometimes the process is slower in the beginning; the chills are there, but not so marked; and the patient does not know what ails him; a "severe cold" is the usual explanation. The facial expression soon changes, the patient appears broken-hearted, downcast, with pale grayish color, and often with flushed cheeks; severe night-sweats occur, the appetite entirely lost, and the strength all gone. The patient presents to the eye a picture, which, though difficult to describe, is most truly pitiable. It is seldom that patients die at once, or on the first appearance of the infection. They generally recover partially; the appetite returns, and with it new hopes, and desires for renewed life. The pulse, however, remains steadily up, the sure sentinel of internal death, notwithstanding the most excellent appetite and the exquisite feeling; in despite of all, such patients gradually and steadily lose, lose, lose, and nothing can arrest the steady and fatal approach of final dissolution. We have had patients who so far recovered as to be able to dance, and to enjoy life in general, but still having death in them; the pulse always indicating its never-changing height, notwithstanding every effort to reduce it. For if, by the utmost care and attention, it was brought down to 90, it would very soon go up again to 130.

The great difficulty is, that although we are positive about the existence of blood-poisoning by pus, it is not generally possible to ascertain exactly where this pus infection takes place. But when this can be done, that is, when its position and seat can be determined with certainty, we recommend in all such cases the immediate expulsion by operation. From personal experience, and from the great advancement of surgery generally, we should not hesitate to perforate almost anything to relieve the body of incarcerated pus, that is, when

we are certain of its exact position. The uncertainty about this is the greatest difficulty, and will often puzzle the most eminently skilled in diagnosis. But whenever and wherever it can be ascertained with certainty, no time should be lost; operation should be made at once, as delay here is very dangerous. It is true, that perhaps in some cases a patient might die sooner than he otherwise would have done without the operation; but as this is the only possible means of saving the patient, it should not be objected to on this account. And the sooner or earlier it is done, the more hope there is of saving the patient, while if not done, or if too late, there is no hope whatever. It is sometimes necessary to inject into the partly or wholly emptied pus cavity, salt-water or antiseptic liquids, when the cavity is so adhered or constructed that it cannot readily contract, in which case the patient most likely faints; but in this way the pus may be completely washed out, and the result is a decided one. It is, however, comparatively seldom that the seat of the pus can be ascertained with sufficient certainty to admit of an operation. When this cannot be done, the limited powers of nature (in this case) have to be depended upon. Little hope as this gives rise to, it must still be done; for nature sometimes helps, either by securely incapsulating the pus, or, as will sometimes occur by some fortunate circumstance, make its escape of its own accord.

In reference to recovery, the one hundred and four experiments made by Dr. Waldenburg offer strong proof of the correctness of our proposed dietetical treatment in tuberculosis. He inoculated seventy-one rabbits, twenty-eight guinea-pigs, one hedgehog, one he-goat, and three horses. All the rabbits and guinea-pigs invariably died in consequence of the operation; the hedgehog recovered twice, and died of starvation after the third inoculation; the he-goat recovered each time after inoculation for seven times, and had to be killed; two of the horses were killed, and one died suddenly, without any direct known cause. The rabbits and guinea-pigs live upon food which contains little or no mineral matter, such as cabbage, etc., while the he-goat lived upon oats and hay, like the horses. The resistance of the latter, the he-goat and horses, compared with or against the unfailing death of the former (the rabbits and guinea-pigs), must be directly attributed to the food. The he-goat offered the greatest resistance, because he was the only animal that was allowed perfect freedom after he was inoculated, thus allowing the instincts of his nature to have full play, giving him an additional chance of helping himself. The very great importance of an appropriate diet, although recognized by all great physicians, has never yet been employed to the extent necessary, from the fact that the knowledge as to what diet was required for a particular case was unknown. The above experiments are sufficient to prove the possibility of the arrest of miliary tubercles; and since here and there a case recovers, which from good reasons had been considered hopeless, the *attempt* to cure should always be made, no matter how often it may prove unsuccessful.

Though we are decided and certain that we can induce the calcification of primary tubercles by our proposed treatment, *the artificial*

calcification, yet in regard to secondary tubercles we are quite upon another ground. The reason is, that although in both cases calcification of the morbid cells is the only remedy, we cannot restore the blood circulation in the other glands, as we can in the lungs; for as yet we have discovered no process by which we can reach or apply pressure to an abdominal lymphatic gland, or to the brain. We have had one case in which secondary tubercles in the brain became calcified; the patient recovering completely, and is to-day both alive and robust. But we confess that we are unable to say how far our treatment aided in this remarkable recovery. We have never, as yet, seen or known of a single case in which abdominal tubercles ever became arrested. We should not, however, give up the attempt to cure, though the success be not only doubtful, but rather unwarrantable. We have never had the opportunity to observe secondary infection in its beginning. All the cases of secondary tuberculosis coming for treatment were already so far advanced, that an attempt at forcible treatment could not be made; the patients being already too weak and exhausted to bear it. We should, however, treat these cases, when not too far advanced, similarly to those of secondary syphilis, employing means of forced excretion with the use of arsenious lime, etc., and the proper diet. But with patients already exhausted such treatment cannot be employed, and before they can be brought, by proper digestion, to such a condition of strength as to admit of it, they die of general blood-poisoning.

The best and surest way is not to permit a patient to become infected by secondary tuberculosis. By following our proposed treatment in the different forms of Consumption, secondary affections can be easily avoided; and it is on this account that our experience in observing cases of this kind has been limited to such as were already infected when they came for treatment. In all these cases we were only able to restore digestion, and to prolong the life of the patient without annoyance, suffering, or conscious pain.

An almost endless number or variety of medicines, manipulations and proceedings have been recommended, either as certain remedies, or as possessing marvellous curative powers; the principal of which are arsenic, quinine, lead, mercury, opium, prussic acid, cod-liver oil, fusel oil, various acids, herbs, plants, roots, barks, air bells, pressure, electricity, inhalations, etc., etc., most of which, if productive of any effect, materially injure the patient.

Being unable to recommend any medicine or procedure that could be in the least reliable, we conclude this chapter with the assurance that when secondary tuberculosis appears at all, it is invariably the consequence or result of neglect either on the part of the patient or physician, or of both together. And it seems to us that as long as we can affirm the absolute possibility of prevention, there is no necessity to hunt or to wait for a remedy which in all probability will never be found.

Disorders of the Arteries, Veins, and Lymphatics of the Lungs.

THESE disorders come under the general name of Consumption more on account of the similarity of symptoms, and the consequent confounding of them with its different forms, than of really belonging to it. The larger blood-vessels comparatively seldom offer the various abnormalities which are so common in other parts of the body, while the vessels of the heart are very often the seat of disorder, which frequently causes secondary difficulties in the lungs, and from being in the direct vicinity, produces symptoms that are often mistaken for, or confounded with, those of Consumption. Prominent among these are the various disorders of the valves of the heart, both right and left. The next most prominent, is the large class of blood tumors, so called (*Haematoma*, *Angioma*, *Lymphoma*), especially the degeneration of the walls of the larger vessels. These are sometimes caused by direct (*traumatic*) injury, and sometimes by disorders of the blood itself. Inflammation of the inside lining of the vessel can occur, causing polypus-like tumors or ulcerous degeneration, or permitting the escape of the blood-globules and fibrin into the three linings of the vessel by a leakage of the inner one; or calcareous concretions, obstructions, enlargements, ruptures, etc. It is easy to comprehend that any such injury of a large blood-vessel, conducting the blood either to or from the lungs, will be followed sooner or later by secondary injuries to the lungs themselves. The fact that the above injuries seldom occur in or near the lungs makes their ready detection more difficult or improbable, which, however, is of the greatest importance in regard to treatment in their earliest beginning. A detailed classification and description of all the possible injuries to which the larger blood-vessels are liable, does not belong here, and therefore we purposely leave it out, the more especially to avoid making our subject, which is already sufficiently complicated, still more so. The lymphatic vessels and their centres, the lymphatic glands, however, deserve a somewhat more particular notice, and the more especially as Virchow, in his immortal lectures on tumors, explains tubercles as belonging under the head of new formations, respectively under the class of lymphatic tumors (*lymphoma*). At the time Virchow read these lectures in Berlin [1863], he was not acquainted with the discovery of the escape of blood-globules into the meshes of the tissues, as first made by the writer in 1857, and afterwards observed by Cohnheim, in Berlin, in 1866. The chapter on tubercles in Virchow's lectures, therefore, is not only not quite clear, but somewhat contradictory. Having observed the escaped blood-globules, and the consequent irritated appearance of the binding tissue-cells, he thought that the latter presented the primary affection, and that the round cells were the product of the irritation. (See his Onkologie, Vol. II. pp. 572-76, and pp. 630-43, and the cuts therein.)

Therefore, since the above discovery of escaped blood-globules, Virchow's explanation of lymphoid and tubercle new-formation, as well as his deductions, etc., can be dispensed with. In the two previous chapters we have given our own explanation so clearly and distinctly, that a misunderstanding or confounding of our views is hardly possible. The fact that as soon as blood-globules escape, and die off, by which the surrounding tissue-cells become irritated, begin to swell, form new binding tissue-cells, and thus form the capsules which are observed around such escaped masses, led to the supposition that the *whole* was a new-formation. We mention this here to draw the attention of the professional reader to a comparison of our explanations with those given by Virchow, whose well-merited authority is so great as absolutely to control the judgment of the profession throughout the world. By such a comparison it will become evident that our explanation of tubercle-formation furnishes the needed link, without which it has thus far been impossible for any one to explain the cardinal question: What is a tubercle, and how does it originate?

The lymphatic vessels are of great importance, because they absorb whatever of residuum is left in the tissues, whether it be healthy or diseased. Hence poisonous liquid, from any process of decay, which may have filtered or oozed through the walls of the vessels into the tissues, or the poison which may be brought into the body from bites, or from post mortem section wounds, or from vaccination, or which may have originated at some particular point in the body itself, is carried through the channel of these vessels into the general circulation. The absorbed poisonous liquid is carried from the place of injury into the nearest lymphatic gland, the immediate effect of which is an obstruction in the gland (which, for the most part, is only a network of the finest lymphatics), causing stoppage of circulation, which, if continued in consequence of newly-absorbed poison, becomes permanent, the gland turgid, or swollen, finally degenerates, undergoing the so-called cheesy degeneration. This process is the one which, for ages, has been called "scrophulosis." The gland, however, may remain in this condition for a long time, and perhaps become calcified, when no further injury will arise from it. But, on the other hand, if not thus arrested, the next gland becomes similarly affected, and so on, until, in every part of the body, swollen and inflamed glands appear. This process is therefore identical with, or rather the mother of, miliary tuberculosis, the former being always found with the latter. The great danger of vaccination lies in this process, which, if physicians understood, they would not dare to vaccinate. It also gives us the key to the fact that a badly vaccinated child may apparently recover, though carrying through life the germ for disease, which may show its effects under every condition or circumstance favorable for its development.

This process of the lymphatic glands has, at all times, the present not excepted, given rise, among physicians, to the very greatest misunderstanding of terms and facts; even Virchow has not been able to explain the puzzle. He speaks of primary tubercles, sometimes in the brain, oftener in the other parts of the body; and also of a primary tuberculosis of the lymphatic glands (Onkologie, Vol. II. pp.

666 and 673). That this is an error, has long since been taught by the writer, and experimentally proved by Waldenburg. Our principal object in stating this here is to remove this confusion, by bringing the subject within the comprehension of all; the *resume* of which can be given as follows:

Tubercles originate from capillary vessels, through interference with circulation and consequent escape of blood-globules into the tissues. We distinguish two forms of this process: first, the chronic form, the primary tubercle which exists in the points of the lungs only. Second, the acute form, the acute miliary tubercle, which is the consequence of pus infection, and found anywhere in the body.

The miliary lymphoma of Virchow is nothing but an acute miliary tubercle. The white blood-globules, as we have learned from previous chapters, obstruct the capillary vessels more easily than the red ones. And a disorder of the blood, scientifically called leucocythæmia, which, consisting in an undue proportion of white globules to the red, thereby favors the escape of the former into the meshes of the tissues, or into the walls of the vessels. And, naturally, the thus formed tubercle consists of white blood-globules, while they are generally formed, as previously shown, from both red and white — for which reason we observe around the two first a ring or circle of blood pigment which is not found in the latter.

We would here just notice a condition which has been called *gangrene* of the lungs, and the diagnosis of which is often made by ignorant and incompetent practitioners. Gangrene of the lungs can only occur in consequence of total obstruction of the lung veins, preventing the passage of the blood out of the lungs. Although such an occurrence is certainly possible in theory, it is very improbable in reality, because that the total obstruction of the large lung veins, to originate spontaneously, requires considerable pathological imagination, and, in any case, death would ensue before mortification could fairly establish itself. We have never seen a case of gangrene of the lungs, nor a post mortem examination of it, nor do we ever expect to see one, although we have seen lungs in almost every possible shape of destruction and decay. Those cases where medical men have *cured* gangrene are not only ridiculous, but afford proof of either ignorance and lack of common sense and reason, or the grossest deception and quackery on the part of such practitioners. Curing gangrene of the lungs is equivalent to curing a dead man. We doubt the existence or occurrence of substantial gangrene in the lungs, although noticed in the hand-books everywhere; small parts of it in a morbid condition cannot be called gangrene of the lungs, which, at least, must comprise one whole lobus.

Disorders of Interstitial Tissue of the Lungs.

THE elastic connective or interstitial tissue, forming the square meshes between the alveoles (air-cells), blood-vessels and bronchi (air-passages), represents that part of the lung which, although necessary, is comparatively the most indifferent. This class of tissue forms the basis for the development of the greater part of all tumors, and new growth in the body, as fibromas, sarcomas (terms applied to a large variety of fibrinous and fleshy tumors), and their kindred — the consequence of some irritation — followed by an over-nutrition of its cells. We find these outgrowths and tumors mostly in those parts of the body which are exposed more or less to injuries from the outside; against which, however, no part of the human frame is comparatively more protected than the lungs, partly from their position and external protection, and partly from their own elastic construction. The appearance of new growth is therefore, comparatively speaking, exceedingly rare in the lungs. When carcinoma (cancer, or cancerous tumors) or other malignant new formations are observed, it is almost always that they have been transmitted from some neighboring part; incapsulated parasites are also found in the lungs, but very seldom. Sometimes concrements (masses formed by concretion or natural union) are found, even newly-formed bone, or cartilaginous formation; but in these respects the lungs are the safest, or least liable of any organ in the body.

The difficulty to which the elastic tissue mostly gives rise, if at all, is abscesses in the lungs. We distinguish two forms of abscesses, the active and the passive (the warm and the cold abscess of old authors). The only difference between these two consists in their origin. The active begins through primary cell formation from the tissue cells themselves. In case of a continued irritation upon the tissue cells, they commence to form new nuclei inside; which they afterwards string off as newly formed cells, which, from lack of nourishment, decay; thus forming a pus cavity surrounded by a capsula of binding tissue, the mother cells. The passive is formed in consequence of an irregularity of circulation in, or rupture of, a vessel, with consequent escape of blood in between the tissues (interstitial hæmorrhagia), which, if not reabsorbed by the lymphatics, by irritation causes a secondary cell formation in the surrounding tissue cells, and also an incapsulated abscess. The latter is the more frequent occurrence in the lungs, causing a serious form of Consumption.

The diagnosis of a lung abscess can become a very difficult thing. Its distinction from tubercular infection is easy, through the difference of their location. An abscess always appears where the blood circulation is active, as in the basis, and tubercular infection always where blood circulation is arrested, in the points of the lungs. It is more difficult to distinguish it from pneumonia, as both are apt to appear in the same region. Here the general symptoms decide. Pneumonia

begins with acute fever, and accelerated respiration; an abscess is only followed later by these symptoms, if at all. The expectoration also here gives a decided distinction by the invariable rusty or peculiar looking sputa containing bubbles, while in abscess there is either no expectoration, or that of bronchitis, thick and heavy. It is also distinguished through auscultation by the peculiar crepitations in pneumonia. An abscess is distinguished from pleurisy by the percussion, which in the latter is even around the chest, while in the former such is not the case; also by auscultation, to an educated ear, from the total or only partial absence of respiration. To distinguish it from an angiome (blood-vessel tumor) of the large vessels is very difficult. It is also sometimes very difficult to ascertain whether we have to deal with an abscess of the lungs, or of the diaphragm, or of the liver.

The symptoms of lung abscess are very undecided and variable. The patient feels something, but cannot tell what or where it is, or entirely mistakes the place. Sometimes severe pain (when the abscess is near the pleura) accompanies it, and sometimes only a dull feeling, and no acute pain. Fever is generally absent, though sometimes present through pressure upon the abscess, or afterwards through absorbed morbid liquid from it. The appetite will sometimes be very good, and sometimes equally bad.

The patient is in a constantly nervous condition, which keeps on for weeks and months without any material change; he lingers about, and tries almost everything; hopes and despairs, hardly lives, and yet does not die, until finally the abscess breaks, and the pus makes its escape. If it escapes into the bronchi (air-passages) the discharge takes its way through the mouth, which greatly alarms the patient. Fever soon begins. Very often severe vomiting accompanies the discharge of pus. After the pus is all discharged, which is not always the case, the hull, or capsula, remains in the lungs. According to the thickness and age of this capsula, it may collapse and heal together, forming a heavy scar in the lung, or it remains an open cavity that is free for air to enter, and continues so. If the abscess discharges its contents into the sack of the pleura, immediate and serious consequences, dangerous to life, follow. In this case an immediate operation has to be performed, or the patient is certainly lost. If the abscess breaks through the diaphragm into the abdominal cavity, the patient is invariably lost in a short time, by acute peritonitis.

The treatment of lung abscess is the most limited of any. Almost nothing at all can be done, the general nutrition excepted, until the abscess breaks of its own accord. If the seat of the abscess could be unmistakably diagnosed in its beginning, the operation of paracentesis would be indicated — but to find its exact seat is about impossible. If the abscess breaks into the bronchi (air-passages), they have to be kept as clean as possible; partly by respiration alone, or by inhalations of antiseptic liquids, with a view of protecting the mucous membrane as much as possible. Sometimes pressure upon the outside of the chest is necessary, and sometimes nothing can be done except to keep the patient's nutrition going, and to prevent

sudden collapse, which, in these cases, frequently occurs. The correct treatment, in cases of this kind, lies in the definite diagnosis and common sense, which, however, is also true in all diseases, though not so directly in a simple sense; — it requires a surgical, rather than a medical treatment. Abscess of the lungs at best form one of those loathsome troubles in which the greatest skill on the part of the physician, and patience on the part of the patient, are very seldom rewarded with a satisfactory result. By incompetent practitioners lung abscess is often mistaken for gangrene, and so also is bronchœctasis for lung abscess and gangrene, which, although seldom making but little difference as to the practical result, is an unpardonable blunder on the part of the medical attendant.

Small abscesses of the lungs often heal of themselves, either by escape of pus into the bronchi, and consequent cicatrization, or they dry up and remain as a chalky substance for life, without any further inconvenience. These, however, are always so small that they can never be diagnosed by any one with accuracy or certainty.

Other disorders of the elastic tissue, such as loss of contractility from over-extension, or loss of substance, shrinking of the tissue, are consequences only of other more serious disorders, and form no object either for diagnosis or treatment; their causes being of so much greater importance as wholly to outweigh them, as regards their being recognized or taken into consideration.

Disorders of the Nerves of the Lungs.

ALTHOUGH important discoveries relating to the brain and nerves were made by Haller, Charles Bell, Ehrenberg, and others, the knowledge of the nervous system thirty years ago amounted to little or nothing. It was not until Dr. Stilling published his exact anatomical studies of the brain and nerves, that great efforts were made, scientifically, to investigate this interesting and difficult subject. The knowledge of this branch of science was then soon increased by R. Wagner, Henle, Koelliker, Schwann, Remack, Muller, Valentin, Ludwig, Bernard, Brown-Sequard, and others, and has continued to increase — new discoveries being made almost every month. At present there are so many who, by experiments and tests, have made very important discoveries, that we cannot here give their names, but will give a fair *resume* of the present knowledge on this subject as far as the lungs are concerned.

From the time when the existence of blood-vessels and nerves became known, physicians who had in view the advancement of knowledge were divided into such as tried to explain the origin of disease as belonging to the blood, and those who attempted to trace the origin to the nervous system. The first are called humoral-pathologists, and the other neuro-pathologists; but as neither the knowledge of the blood nor of the nerves was exact, or the office of either fully comprehended, both failed in reaching what they attempted. It is only of very recent date, that there existed the possibility of solving this problem; and we find, that to a certain degree, both views were correct; but wrong, so far as they were too one-sided.

We distinguish four different systems of nerves: the first is that by which outside influences are felt, perceived, and communicated to consciousness; the second is that by which the brain moves and directs the motions — the executive system; the third is that by which we live — the regulator of our animal economy — and is not under the control of the will; the fourth is that which checks and balances the motion of the two latter — the depressing system. The central organ of the two first, we find in the large brain; the seat of the third is along the spinal column, and has no particular central point, but a chain of smaller communicative knots, called ganglia; the fourth has its seat in the small brain. These four systems intercommunicate with each other according to their purpose and office; and we find what used to be called *one* nerve, a conglomeration of all four, or of three, or of two, or sometimes only a single nerve-fibre. Each system of these nerves can be classified again, in regard to the difference in their modus operandi; for example, among the sensitive nerves we have such as communicate only sensations of tickling or pain, and such as feel hunger, thirst, or the necessity of breathing, or similar functions. Among motory nerves we distinguish principally between such as are directly under the will, and such as are only par-

tially so, or not at all, etc. In science, the functionary organs of these different nervous systems are called the central organs, or nervous centres; the nerves themselves, as they spread like the branches of a tree from these centres, are called the peripheric portion, or nervous periphery. The anatomical difference between the two is, that the centres are composed of peculiar cells of different shape, while the nerves consist of cells which represent little tubular cylinders only. Each nerve-fibre can convey only one kind of sensation; and if this nerve-fibre is irritated at any point, it communicates the sensation, as if coming from the periphery, and not from the place of irritation. This explains why a man has pain (seemingly) in the toe of the leg, which was amputated years before; and why he may have a disorder in the lungs while he feels as though it was in his throat, or an injury to the liver or stomach which may appear as severe headache.

The sensitive nerve of the lungs is called the pneumo-gastric, or vagus. It is purely a sensitive nerve, but receives connective fibres from several motory nerves, both before and after it leaves the brain, and therefore acts in both ways. It conveys for the lungs, the sensation of respiratory necessity; for the stomach, the sensation of hunger and thirst. There is both a right and a left vagus; and when they are both cut, death is the result. The feeling of respiration, as well as of hunger and of thirst, are gone; an animal thus injured dies of suffocation, while the heart still beats, and in most cases doubly quick and irregular. The vagus does not communicate any sensation of pain, and therefore we could cut into the lung without pain; but soon after we should feel the sensation in the throat or head, as though the lesion had been there. By reflex action the vagus communicates the injury, for instance, to the fifth nerve, or trigeminus; then we should feel it, and may feel it in any portion of that nerve, but not before. Sensitive fibres of pain-conveying and motory nerves, go down with the vagus to the heart, but not to the lungs. And this is why the heart reacts much more quickly than the lungs, and changes its beating, with any irritation on the brain. It also explains the reason for our speaking of a heart-ache, and never of a lung-ache. Pain experienced on the chest never comes from the lungs, but from a very fine membrane around them — the pleura — or from the muscles of the ribs.

If we open the fine sheet in which the vagus runs, we shall find another nerve in it, thinner than the vagus, which, however, sometimes runs in a sheet of its own. This is the sympathicus, or sympathetic nerve. It has no sensation or sensibility whatever, but its fibres run with the very finest blood-vessels, not only in the lungs, but all over the body, from its different centres, which lay together along the spine, like a rosary. This nerve regulates and balances the circulation of the blood throughout the entire body, which is its only office. Whatever function the blood has, it is performed by the aid of this nerve. The immense importance of it may therefore be readily understood. By its action we get out of order or sick, and also get well again. No physician can in the least comprehend the real character of a disorder, or in any way aid a patient, unless he thor-

oughly knows the anatomy and nature of this nerve. What has been known as the great power of nature in healing diseases, lies wholly in this nerve; and the better we understand its silent language and its wonderful actions, the more power we gain over our own bodies, for injury as well as for relief or help. *All* diseases, direct or traumatic injuries excepted, have their origin in some injury of this nerve. We may justly call it the prime minister of our animal life.

If we closely examine the contents of the nerve sheet for the thorax, we find a third very fine nerve (which, however, sometimes runs in an extra sheet with the sympathetic, or the vagus, or entirely alone, or all three together), which varies in different individuals, as well as in various classes of animals. This lately-discovered nerve is called the depressor. It counteracts the motory branches for the chest, especially those of the vagus. Small as this nerve is, it fills a highly important office; and its injury results in violent action of the vagus, causing spasms and serious trouble.

The fact that the principal nerves of the liver, stomach, heart, and lungs, are the same nerves, gives the ready explanation why a disturbance of one of these organs is always accompanied by more or less disturbance in the others.

The three nerves of the lungs, viz., vagus, sympathicus, and depressor, together form the plexus pulmonalis, or the nervous centre for the lungs and heart; the trigeminus, however, does not reach the lung tissue, and therefore any sensations from the lungs cannot be felt until it reaches this nerve, which reaches the large vessels of the heart, which lie between the lungs, directly under the sternum, or breast-bone. To give an exact description of the minute details of injuries to these several nerves, or their centres, would carry us far beyond our present purpose; but we shall endeavor to give a bird's-eye view of the subject. Since all the nerves of our body communicate with each other through their centres, the principal of which is the brain, a peripheric injury of any kind must be felt all over the body, and consequently in the lungs. We therefore find the action of the heart and respiration to correspond with all that happens to our body. A sudden irritation on any part of our system results in a momentary arrest of the heart, after which it begins to throb quicker. A deeper or quicker respiration is the next consequence. The great elasticity of the lungs, and the surplus amount not ordinarily required for use, are the protective balances which prevent these sudden irritations from injuring us seriously, unless they are very excessive, and of long-continued duration. The absence of any extraordinary irritation for a long period, or the sudden and continued loss of an accustomed one, is more harmful than sudden irritations. While excess would generally result in acute pneumonia, neglect invariably results in tuberculosis. We have illustrations of this in men who are confined in prisons; in persons who by suddenly getting rich become lazy, or give up their accustomed nervous irritation; in Indians who become subject to the civilization and luxuries of the white man; in animals confined in menageries, and in domestic animals too closely confined in their stalls. We have seen perfectly

healthy wild animals die in two weeks from tuberculosis, in consequence of complete confinement. With men the process is slower; but a strong, active man, or an Indian placed in close confinement in prison, could exhibit tubercles inside of three months, and perhaps much sooner.

A similar effect is produced, though much slower, by mental depression, sorrow, or misery; long-continued diseases, that wear out the patient; — unhappiness, and the loss of friends or children, often result in chronic lung diseases, through nothing but the loss of nervous irritation. The chest begins to sink forward, the upper parts of the lungs are not used, and tubercles make their appearance. Although it is known by all intelligent physicians that mental depression is one of the most serious troubles which can befall a human being, it is but seldom the correct treatment is found, because it takes an eye much sharper than that of an ordinary practitioner to discover the presence of mental pain, which such patients usually conceal.

Next to mental depression, are real organic disorders of the nervous system; effusions of blood serum into some part of the brain or nerve sheets, parasites in the brain, tumors or abscesses, pressure from an inflamed and swelling bone upon the brain, etc., etc., would more or less interfere with or injure the functions of the heart and lungs. These, however, are very exceptional cases.

A highly important, and for our subject a most interesting process, is the suddenly abnormal change of action of the nerve-cells of the gray mass of the brain. The facts are well-known, but the exact process is not, as yet, clearly understood. It has been observed that a small irritation on the nerve of the eye or ear may occasion the most violent spasm in the chest; or a peculiar smell, change of climate or atmosphere, etc., may produce a similar result; or the same thing may occur without any external irritation, but most likely caused by some chemical action of the blood itself. The theory is that these cells suddenly arrest their ordinary current, or reverse it, by which a nerve, the depressor, for example, is rendered powerless, thus leaving the vagus to act with unchecked violence. A large number of cases of nervous asthma have their origin in this cause. The scientific world are now engaged on this subject, with a view of solving the mystery which at present hangs over the secret functions of the brain-cells; and, when solved, the as yet loathsome, and in most cases incurable, nervous asthma will doubtless find its proper remedy; but we repeat, that the asthma occasioned by capillary bronchitis has nothing in common with this form of it.

This particular arrest of the action of the brain-cells explains the cause of some most peculiar lung-bleedings which sometimes occur, and for which, thus far, no cause could be detected. For if the brain of such a person be examined, as a matter of course nothing whatever will be detected. The very direct relation of the brain upon circulation and respiration of the lungs, can be shown by experiment. For instance, if a needle is inserted into the small brain of an animal in such a direction that its point comes in contact with the bridge between the large and small brain towards the spinal cord, it will be

found, on killing the animal, that bleeding in the lung tissue proper has occurred. If the animal is not killed, it recovers again in a few days. Or if an animal is killed by a blow, given in a similar direction upon the small brain, the same lung bleeding will be observed.

The nervous system and its life has always given the human race the basis or foundation for the wonderful and incomprehensible. It was believed that the soul was somewhere hidden in the brain, and that the peculiar nervous actions were the symptoms or manifestations of this soul, and were therefore made to serve as a key for all phenomena which reason could not explain. This belief has always been, and continues to be, the foundation upon which charlatans and impostors of all kinds build, and the source from whence they reap their great harvest. So strongly has this belief entrenched itself, that even now, it haunts the brains of physicians in a very remarkable degree. Instead of coolly studying that which, to their present reason, is incomprehensible, they fall back upon this old and shallow phantom. The anatomist and physiologist of to-day know that there exists nothing about it that is wonderful or incomprehensible. *It is an instrument which is as mechanical as a piano, and which acts and reacts mathematically, in accordance with the way in which it is touched.* As a great pianist knows, from a single touch, the quality of his instrument, so the great physician knows the quality of the human brain. The touch of the artist cannot be taught, neither can this faculty be communicated from one to another. It is only the brain which is perfectly formed from nature, and sharpened from natural experience, that possesses it, and therefore existed thousands of years ago, as prominently as to-day. The old physicians, who in reality knew nothing of science as now known, had this faculty in a very high degree; and, by this intuitive acuteness, made most remarkable cures in their day. And this is the reason why that an old woman often cures a patient where the most learned physician has failed — we say *learned*, not educated. That which we call imagination is not a myth, a nothing, but a real action of the brain-cells; and when these are sick their motions are not perfectly regulated, but move like a weather-vane to any influence. To know this, and to see, understand, and to control it, is as much of a necessity for the physician as it is to regulate the motions of the intestines directly. And here we have the reason why the humoral pathologist, so-called, fails — because he disregards the nerves; and also why the neuro-pathologist fails — because he diregards the blood. Whoever can control both, has the most absolute power over the human economy, and can command every cell of the body to do what it should; and in no case is this understanding and power of control more necessary than in chronic disorders of the lungs; for when the power of the nerves gives out, we cannot succeed, even if we bring the blood into the most perfect condition and circulation; which if we cannot accomplish, the nervous power alone will help no more than the wish will accomplish the deed.

The regulation of the nervous action of the patient does not lie in medicine nor in manipulations, but in the reason of the physician.

Here the knowledge of all the medical discoveries, past, present, or future, will not help us. The remedy is the logical reasoning of a normally developed and educated brain, which has acquired the faculty to comprehend the more or less barren state or condition of that particular brain requiring treatment. This remedy, however, is not always unfailing; for if the best seed is sown, under the most favorable circumstances, upon stones, it cannot thrive. The better the soil into which the seed is cast, the quicker and more thoroughly can we control vegetation; the only difficulty being that weeds grow as fast as the wheat, and sometimes faster. The physician is here the gardener, who must destroy the weeds by inducing the wheat to overgrow them, and so keep them down. Here lies the endless study of the physician independently of science, and here is where the young scientist is at fault, and where the old ignorant brain has the advantage.

Disorders of the Pleura.

ON each inspiration the lungs have somewhat to change their position in the thorax, whereby a friction with the solid portion of the chest necessarily occurs. To obviate any inconvenience or injury to the lungs, or to the framework of the chest, each lung is provided with a very fine covering — the pleura — a serous membrane, with which the inside of the chest is also lined. By means of this double membrane the lungs move freely, and without disturbance in the chest, as the eye moves by means of the conjunctiva. That these two sheetings, or the membrane covering each of the lungs and the walls of the chest, must be provided with moisture to prevent attrition, may be easily comprehended. For this purpose they are plentifully supplied with fine blood-vessels, which keep up a certain amount of liquid sufficient to allay all friction. The superabundance of this moisture is reabsorbed by lymphatic vessels, with which the pleura is well provided.

It will not now be difficult to understand that, in case of some unusual exercise, it can be possible that more liquid is supplied than necessary, in which case we should find some watery serum in the sack of the pleura; a phenomenon which is almost always met with in post mortem examinations. This is not a real disorder, but should this water, in consequence of relaxation of the sympathetic nerve, exceed a certain limit, it would begin to molest the lungs by pressure, and interfere with respiration. This is a condition which is known as dropsy of the chest (*hydrothorax*). It is often found in cases of emaciation, of severe loss of blood, a companion of a great many diseases, and not an unfrequent trouble in old age, when the nervous system has been overtaxed in youth. The greater or less facility of the reabsorption of this liquid stands in an exact ratio to the more or less powerless condition of the nerve-controlling circulation. Hence as regards medical assistance, the recovery of the strength of the nerve must be the only object; all other medicines or procedures are purposeless.

Next to this disorder, which is of a chronic character, stands the same process in an acute form: acute inflammation of the pleura — pleurisy. This is occasioned by a sudden arrest of nervous action from some cause, which permits the blood-vessels to enlarge beyond their limit, and the consequent sudden and serious escape of fluid into the sack of the pleura. Severe oppression and pain, accompanied with a general disturbance of circulation and fever, is the immediate consequence. This disorder is quite common, and, when not properly attended to, often results in serious lung affections, as a complication. Several lung affections, on the other hand, such as pneumonia, tuberculosis, and general blood-poisoning, are also sometimes complicated with this. In such cases pleurisy is a very disagreeable complication, especially when the effusion is in itself of a morbid character, while

when simple, and occurring under otherwise normal conditions, it heals very readily when properly treated. The invariable result of inflammation of the pleura is the growing together by adhesions of the pleura sheets, which sometimes occasion sharp pain upon respiration, and is a very common difficulty; so common, it is but seldom that in post mortem examinations the pleuræ are found perfectly free from adhesions.

To distinguish pleurisy from other affections, is in most cases very easy for an educated physician, but to judge correctly about the exuded matter itself, especially in chronic cases, is sometimes very difficult, and may require a test operation. This consists in the insertion of a small tube between the ribs into the cavity, by means of which some of the liquid is taken out and examined. Should pus or putrid liquid escape, then it is necessary to introduce a larger tube, to remove this morbid mass. This operation, though in itself not dangerous, is one, however, which should only be resorted to in absolutely desperate cases; because if the lungs be adhered so as to prevent their ready expansion, the difficulty is not overcome, since direct fresh escape of liquid takes place from the blood-vessels to fill out the empty space; and while the strength of the patient would be reduced on the one hand, on the other the newly-escaped fluid would soon putrefy, and the case would not be improved by it. In such cases it becomes exceedingly difficult to decide whether or not an operation is advisable; and before such an operation be undertaken, we strongly urge that the very best surgeons within reach should be consulted with reference to it. It is not the quantity, but the quality of the matter which is to be considered; and unless there are decided signs of general blood-poisoning, or immediate danger of suffocation, an operation is not advisable. This operation is very often made, especially in France and in this country, not only uselessly, but much to the injury of the patients. We have had several patients who had been operated upon as many as nine and twelve times, becoming worse each time, but who fully recovered, under proper treatment, by reabsortion. In one case especially, the left side, in consequence of nine operations, was so filled with the water, that the lung was pressed up under the clavicle, forming a solid mass, as in the fœtal state. Under proper treatment this liquid was so far reabsorbed in five weeks, that the patient could return to his native place, Bangor, and to some extent attend to business. The exudation in this case had been of more than two years' standing.

The correct treatment in such cases is, after regulating digestion, to try, by inhalations of air into the confined lung, to press upon the exudated matter, at the same time employing such remedies as on the one hand stimulate the lymphatic system, and on the other the nervous system. If this is properly arranged, the reabsorption will readily commence, unless the lung is adhered to the chest, in which case it takes place very slowly, or not at all.

In consequence of an external injury to the chest, and sometimes, also, in consequence of the rupture of the over-extended vessels of the pleura, blood will escape into the pleural sacks. If, in such cases,

the least particle of air penetrates the lung tissue, and reaches this blood, putrid composition will follow, which under all circumstances presents a dangerous condition. The treatment is materially the same as in pleurisy, modifying itself to the general conditions in question.

Another disagreeable affection is the escape of air into the sack of the pleura. In such cases the chest becomes extended, since the air enters readily by each inspiration, and cannot escape in expiration. According to the causes and nature of this escape of air, it must be withdrawn by means of a canule inserted between the ribs, or left for reabsorption, as the case may be. The treatment in all these affections depends entirely upon the complications, and the general conditions connected with the lesion.

Although the different disorders to which the pleura is liable are in themselves generally manageable, in connection with chronic lung affections they become a great burden and annoyance to both patient and physician. The treatment for the lungs consists in extending them with air; but as soon as pleuritic disorders appear, this cannot be done on account of the pain produced, or from mechanical hindrance. It is but very seldom that the lungs and pleura become diseased at the same time; and when one follows the other, it is invariably the fault of the attending physician.

Tubercles, and obstructions of capillary circulation by emboli, although generally present with tuberculosis of the lungs, do not come within the reach of direct treatment, and are always of a secondary nature. They will generally heal by adhesions around them as soon as the lungs arrest further disorganization. New growth and carcimona are also most always secondary in the pleura, and form rather a rare occurrence, and offer very little chance for treatment.

Disorders which may be mistaken for Consumption.

THE various disorders of the heart, and of its large blood-vessels, are prominent among those which may be mistaken for lung disease. Since, as we have learned, the nerve plexus for the lungs and heart are the same, the symptoms, as they appear to the patient, very frequently offer great similarity. For the same reason we find a cough more or less present with heart diseases; first, on account of the same nervous irritation, and second, because in any heart disease the blood is thrown into the lungs more or less irregularly, by which they become over-filled at one time, causing too much pressure, and, at another, less than filled, which, from too little pressure, results in the blood running backwards in the lung vessels. In case of large blood-vessel tumors, these press directly upon some part of the lungs, and are thereby not only productive of symptoms, but also very commonly of inflammation of the parts in question. Since, from the present state of knowledge, all the organic disorders of the heart are incurable, they are of importance more for correct diagnosis than for treatment, which, through mistake, may either be wrongly applied or altogether neglected. The nervous affections of the heart, however, are of much greater importance for recognition, since they are in most cases curable. They appear as a simple palpitation, and upward to the most alarming spasm of the heart, and are always occasioned directly from the brain, either from organic disorder of it, from interrupted cellular motion, or from a general blood disorder. In cases where such affection of the heart has been of long duration, the lungs almost always present pneumonic patches or bronchial catarrhal affections, which, unless the original cause is discovered and removed, are incurable, and, in time, necessarily produce more severe lung disorganization, while when reduced to their primary cause they readily yield to treatment. One of these affections is the so-called "drunkard's cough," which readily demonstrates the direct connection which the brain sustains in reference to the lungs and heart. If such a patient falls into the hands of an empirical physician who uses cod-liver oil and whiskey, or fusel oil, as a remedy for Consumption, it can easily be imagined not only that such patient cannot recover, but must fall an early victim to the ignorance of his medical adviser.

Sometimes, but rarely, however, the lymphatic glands of the thorax swell, and, by pressure, produce symptoms somewhat similar to those of lung diseases. General disturbances of the body are almost always the cause of this difficulty, and the proper treatment, of course, varies in accordance with the primary cause of it. The various affections to which the larynx is liable, could also possibly produce symptoms which might be mistaken for incipient tuberculosis, though such mistake, for a physician, is hardly possible. And here attention may be called to the hardened pieces of phlegm which lodge between the

vocal ligaments, and frequently annoy patients very much, and during long periods.

The specific blood disorders are of very great importance, and the excessive superabundance of the white blood globules to the red ones stands first among them. This disorder was discovered by Virchow and Bennett, and mostly occurs in young girls. The precise cause of it is not yet certainly known, but disturbance in the nervous system is most likely the cause. Such girls appear pale and exhausted. The circulation of the blood is too slow, and general nutrition is deficient. Palpitation of the heart, upon the least exertion, mental depression, and later, a so-called lymphatic lethargy appears, which renders the patient unfit for anything. From the slowness of the circulation in the blood-vessels, and the mental depression, in connection with a neglect of and a sinking downward of the chest, these patients are in great danger of tuberculosis of the lungs. Iron has been, and now is, the most prominent medicine used by the profession in these cases. Its effects are wholly due to the fact that it contracts the blood-vessels, to some extent, thereby producing a somewhat quicker circulation. No other effect is due to the use of iron. The correct treatment consists in at once changing the direction of the mind of patients, forcing them to some moderate exercise and occupation of their time, and in the regulation of their digestion, by a diet which consists of such material as will introduce the necessary minerals into the body and be easily digestible at the same time. The drinking of natural iron spa water is advisable, especially if the patient goes to the springs, where the current or direction of the mind becomes changed as well.

Another affection of the blood is a so-called watery condition—the result of deficiency of blood globules generally, which may cause serious difficulty in respiration, and requires very careful treatment.

Among the other prominent blood disorders, are an excess of fibrin, and of albumen, which, upon unusual exertion, tend to produce acute pneumonia. These, however, are spoken of under the respective Chapter on Pneumonia.

Blood-poisoning is also very important on account of its action in developing Consumption. This may occur through a neglected abscess in some part of the body, but more especially it is bad vaccination which lays the foundation for later phthisis, and is one of the causes which afterwards is termed inherited Consumption. A child is vaccinated; some morbid pus cells are introduced into the circulation, become caught in a capillary vessel, obstruct it, and begin gradually to infect the neighboring cells, until at last the most dangerous disorder appears. But then vaccination is never thought of or blamed for the first cause. The organs mostly affected by this are the kidneys and the lungs; the first resulting in Bright's Disease, the latter in Consumption. (See the writer's treatise on Small-pox and its Preventives, etc., second edition. Alexander Moore, Boston.)

We now come to the sympathetic affections of the chest in which there is absolutely no organic disorder, but where, by reflex action of the nerves, there is cough, and pain appears in the chest. Chronic

affections of the left lobe of the liver are quite often connected with cough, which is caused by pressure upon the pneumo-gastric nerve. Of these latter we have seen many cases which had been treated for Consumption, especially if a slight bronchial catarrh was present at the same time. Bright's Disease, and abscesses of the kidney, are often accompanied with real or seeming affections of the lungs, and are mistaken for Consumption. But among all the sympathetic affections of the chest, the various affections of the uterus are the most common. In the first place, the depressive mental influence which accompanies all uterine disorders directly affects respiration, and afterwards neglect of the lungs, which, in the end, results in tubercle formation, as previously shown. But the severe symptoms which sometimes appear in the chest while the chest itself is not affected, caused by uterine trouble, is really surprising. Such affections are most commonly produced by dislocations of the uterus, and we have known several cases where the patient had all the symptoms of hectic decline, and who had been treated for months and years for lung affections, while their real difficulty was nothing but a dislocation of this kind. In these cases, the replacement of this organ produces the most astonishing effect; so much so, that from the very rapidity of change the patient can hardly realize the facts — palpitation of the heart, with severe pain, cough, and spasmodic affections of respiration of months' standing, all disappear in a moment.

Next to dislocations, or misplacement of the uterus, comes chronic inflammation of this organ. Here the sympathetic effect is not so rapid, but appears gradually, and is therefore very easily taken for incipient lung affections, which may, however, from long neglect, really occur. Here the correct diagnosis helps the physician at once in regard to correct treatment, which, in itself, is too well defined in the Hand-books on the Diseases of Women to require any special attention here.

Another disorder which affects the lungs more or less is comprehended in hemorrhoidal difficulties. Hemorrhoids, or piles, consist in an enlargement of the veins of the lower extremities and of the pelvis, occasioned by lack of muscular pressure, and caused either by neglect of the proper use of the muscular system, or by excessive abuse of the nervous system. In such cases the blood cannot ascend properly in the veins towards the heart, the consequence of which is an enlargement of the veins in those parts where the pressure is the least upon them; then the blood coagulates more or less, and forms those knots known as piles. At certain times these vein tumors break, and discharge an amount of blood, which more or less relieves or exhausts the patient. If, now, an undue and improper course is taken by which this process is forcibly and unnaturally arrested, as by galvanism, or the application of strong stypties, a congestion of the lungs very often occurs which results in bleeding, and if not immediately recognized and properly treated will end in the destruction of the lung tissue. In such cases the hemorrhoids must be made to bleed again, by leeches or by hot applications, which will arrest the lung-bleeding at once. We have several cases in recollec-

tion where patients cured themselves of piles to die soon after of severe hemorrhage, which they considered Consumption. Instead of bringing back their piles they went South, or to Europe, for the benefit of their lungs. The great danger attending the sudden arrest of piles has been well known by the practical physicians of all ages, and their importance recognized in olden time, perhaps, better than to-day. This sudden transference of a disorder from the original point to the lungs, consequent upon improper arrest, was called Metastasis, and was so much feared that old practitioners would often refuse to cure the piles, or old ulcers, on this account.

Finally, there are various affections of the skin which can, sooner or later, injure the lungs. The skin, to a great extent, is an auxiliary organ of the lungs, and, therefore, any interference in its functions falls directly upon respiration. On the other hand, we observe that in all lung affections the skin has to aid in respiration more than ordinarily, therefore a sudden arrest of the dermal functions often result in bronchial catarrh or congestion, a fact which is too well known to require detailed specification. In all such cases it is easy to comprehend that the treatment must be directed to the skin more than to the lungs. The beneficial effects arising from treatment in the various bathing establishments, is entirely owing to this connection of the skin with the lungs.

Disorders arising from External Influences.

ALL the disorders we have thus far described are possibilities to which the lungs are liable from within the body itself; but since this organ is in constant contact with the atmosphere, we have to glance at any possible injuries which may arise from this source. We divide this subject into — 1. The influences of different atmospheres; 2. Of injuries from poisonous gases; 3. Of poisonous liquids; and 4. Of solid particles.

All who have made themselves conversant with what has been written on Consumption, will have noticed the great importance which all writers on this subject attach to climate and various atmospheres. These views, which have arisen from a total ignorance of the mechanism of respiration, are, consequently, for the most part wrong. All who have fully comprehended the mechanism of respiration, as here advanced, must plainly see that the atmosphere, as such, has no more to do with respiration than it has with walking or thinking. The atmosphere of our globe is everywhere the same, varying only in weight at different altitudes, and in the more or less of moisture which it contains. The variations of ozone and of electrical currents are also evenly distributed, and have nothing directly to do with respiration. Besides, the lungs are perfectly arranged, with muscles and their proper nerves, so as immediately and fully to accommodate themselves to any change of temperature, or difference in the weight of the atmosphere; as the eye, from its construction and arrangement, accommodates itself to different degrees of light. Therefore, whether a person breathes at the north pole, at the equator, on the sea-shore, or at an altitude of 6,000 feet, the mechanism of respiration is exactly the same. The reason why persons bleed from the lungs at great altitudes, is on account of the rarity or thinness of the air at such heights, the corresponding pressure to meet the requirement of the heart's action thereby being lost, so that the blood cannot be forwarded quickly enough through the lungs to balance the quantity thrown by the heart. To a superficial observer it would seem as if, in diseases of the lungs, different pressures of atmosphere could exert some influence, but, in reality, this is not the case. A person who has lost the use of so much lung, be it more or less, will suffer in proportion from it anywhere, exactly as he would suffer from the loss of a part of his hand, because the pressure is even or alike on his whole body. It is only by placing the body under two different atmospheres that any decided influence can occur; such, for example, as the artificial air-bell system, from which, however, no curative benefit can be derived, it being only productive of more injury. Great importance is also attached to the evenness of the temperature of the atmosphere. If we put a patient suffering from lung disease into an even temperature, he feels better, from the fact that the bronchial muscles have not now to counteract the difference of temperature,

but in no way is anything gained by this. It may answer very well for the temporary comfort of the patient to put a half paralyzed limb into a condition of absolute rest, but it will not avail for the curing of it; for the purpose of cure we *must* exercise it. And this is equally true in reference to the lungs. The laws for the lungs are exactly the same as for any other part of the body. If we have a disordered member it is absolutely necessary to regulate and reinduce proper circulation of the blood in these parts, and in no way can this be reached by inactivity. The experience that in even temperatures and warm climates consumptives die sooner than in temperate and changeable climates, exactly accords with this explanation. A tuberculous person in the tropics generally dies in a year, while the same person in Boston may live twenty years. The reason for this lies in the very necessity of exercising the involuntary muscular system. But in cases where these muscles are absolutely incapable of action, then the strictly even temperature is not only advisable, but positively necessary; as, for instance, in acute pneumonia, in spasmodic affections, as in some forms of asthma, and in various forms of bronchial catarrh, where the muscles themselves are inflamed or spasmodically contracted. In these cases an attempt to exercise these respiratory muscles would be as senseless as to force a man to walk while under the power of a spasm in his leg. The latter would break his bones, the former would rupture some blood-vessel in the lungs. And here we have the reason why certain forms of catarrh and asthma readily heal in certain climates, while they would not in others. The effect does not lie in the specific of the climate, but in the required mechanical action of the disorder. Therefore, if we understand what is necessary in the case, and what we should attempt to reach, we can effect the same at home as well as away from it. What we wish especially to say is, that no climate or air has anything *specifically curative* or beneficial, in itself, for the lungs, but if the mechanism of the one in question is understood and managed accordingly, any lung will act correctly in any climate or in any country. We make this remark principally for those who, for some reason, are unable to change climate, even in case such a change should be advisable; they can obtain the same effect at home as soon as they comprehend the mechanical points in question. The lungs act as certainly and as regularly, under proper management, as a watch does under the same circumstances. The idea of the specific effects of the air of various climates exactly corresponds with the idea of sending a watch out of repair, or keeping bad time, to a different climate. The watch may possibly go better for the change, but a watchmaker could have made it go still better at home, provided he understood the difficulty or faultiness of the mechanism.

But with impure or poisoned air the case is decidedly different. To some extent the air in crowded cities, in filthy localities, and in swampy places, etc., is always to be considered as more or less poisonous to a certain extent. This fact is so well known that we omit, here, further exposition. But we may here assert that the lungs, in such cases, are less directly injured than the blood itself,

and, therefore, that lung affections from this cause are more the consequent of bad blood than of any direct effect upon the lungs themselves. It requires positive and strong gases of a poisonous character, such as chlorine, arsenious vapors, etc., to inflame the mucous membrane of the bronchi.

Injury to the lungs from the inhalations of poisonous liquids is not of frequent occurrence. It is possible that pus expectorated by consumptives, and diffused in the air, might injure the mucous membrane of the attendants; and hence it is not advisable to expose one's inspiration to immediate neighborhood or contact of a lung-diseased person. Infection from lung diseases can occur this way, but never in any other, under any circumstances whatever. The inhalation of such serum as is coughed up by animals having what is termed the glanders, is exceedingly dangerous, and results in direct affections which are followed by death. For myself, I should not be willing to be exposed to the poisonous matter thrown off by the snorting of an animal so diseased, the direction of the wind being towards me, at a distance of twenty yards. We would also here remark that the inhalation of finely-dispersed liquids of a strong character is not without danger unless properly managed, and for a certain purpose only. To use the liquids advertised for sale for this purpose, to say the least, is not without great risk. Such inhalations are only indicated in bronchial catarrh, and in no other disorders whatever.

The inhalation of solid particles forms a most important subject. Among these we may first mention the imaginary objects which haunt the brains of physicians, and afterwards the real ones. The former consist in the inhalation of organic spores, or germs, of all sorts. Since the microscope came into almost universal use, the different and most minute particles floating in the air have been observed; and, as a matter of course, as soon as something was observed by certain speculative persons which was strange to their former conceptions, they at once attached all sorts of ideas to their importance. The disease germ idea, or the notion that diseases are carried from one to another, has of late found lodgment in the heads of persons like Prof. Tyndall, who, infected by such a luminary of a former pathology as Dr. Budd, of Bristol, England, came to analyze dust, and involuntarily began to attach great importance to the harmless particles found floating in the air, as the most dangerous carriers of disease. Since, in the chapter on Cells and their Life, we have learned that such a thing as disease, as such, or noxa, *does not exist*, we can readily put down *all* such speculations as either a gross mistake, occasioned by a total unacquaintance with medical knowledge, or an attempt to create an excitement merely for the purpose of notoriety.

Among the solid particles floating in the air, the organic spores or cells are the most harmless, for the reason that they become readily caught by the hairy epithelium of the nostrils and bronchi, and by its ciliary motion are directly brought up again. This hairy epithel, as we previously learned, begins in the nose, a fact of which every one is conversant, extends through the nasal passages, into and down the bronchi, in all their ramifications, almost to the alveoles

or air cells. It is, therefore, absolutely impossible for any solid particle to reach or enter the alveoles, to say nothing of the blood, to which only such gases as are as thin or thinner than oxygen can have access. The air of the fields and forests is loaded with organic spores, but nobody as yet ever experienced any inconvenience from them; on the contrary, lung patients are sent to pine forests to breathe the air thus loaded, in hopes of being thereby benefited. But this is one of the curious blunders of medical men, like that of prescribing cod-liver oil to a patient, and forbidding the use of butter and other fatty or oily substances for food. Brewers and maltsters continually breathe an atmosphere heavily loaded with ferment spores, but they have never been known to have become thereby affected in the smallest degree with disease of any kind. We, therefore, put down all organic spores as harmless, so far as respiration is concerned, but the inhalation of inorganic, and especially of metallic dust, forms a much more serious subject. The dust flying in much-frequented roads and in the streets consists, to a considerable extent, of minute particles of stone. The inhalation of this, by its specific weight and sharp-edged or angular forms, is injurious, because such particles work themselves into the epithel, and get caught, occasioning an irritation, and an increased difficulty in their being expelled. This is especially noticeable in reference to metallic dust, and particularly of steel, where it will be found that most of the workmen in this metal suffer from catarrh, occasioned by the continued inhalation of these sharp-edged metallic particles, which operate like a sharp instrument in the trachea and the cochleæ of the nose. We find the same, to a considerable extent, among stone-masons, and all such laborers as are exposed to this dust. The effect of a continued inhalation of such dust occasions first a more profuse discharge of mucus, afterwards an enlargement of the mucus glands, causing a less regular motion of the hairy epithel, and finally enlargement of the blood-vessels—inflammation. If this is not arrested in due time, the dust gets access to the bronchi lower and lower down, until, in time, pneumonic patches appear in the lung tissue occasioned by bronchitis.

To those especially interested in the spore and dust theories, we strongly recommend the reading of the various experiments and papers by Dr. Hilgard, who, in the most positive manner, has shown the utter fallacy of the whole thing. (See Proceedings of the Am. Ass'n. Adv. Science, 1870 and 1871, and American Journal of Arts and Sciences, July and August, 1871.)

The treatment for all such affections as are occasioned by the inhalation of dust or gases, etc., of course points to the preventing of the first cause, and in such procedures as have already been indicated in the respective chapters on Bronchitis and Pneumonia. The inhalation of finely-dispersed sea salt, spirits of turpentine, etc., can here come into consideration; but since most of these patients are obliged to work for a living, and cannot change their avocation, little or nothing can be done, in most cases, for them.

While the opinions here expressed relative to a change of climate

and atmosphere are, to a great extent, in opposition to the general conception, they will be found, on examination, to be in accord with those of the greatest and best authorities on this subject. It is certainly advisable, if possible, to select the best air and circumstances for every patient, but to attach any peculiar *curative* effect to soil, air, or climate, is a great mistake. (See Niemeyer on this subject.) We admit that the mountains of the West Indies or of Peru offer the best of air, but we lose all comfort and necessary food. One must have been at these places to have a proper judgment about it. Prof. Bamberger, on this particular point, concluded his lecture on Consumption with these words: "Gentlemen, if your patients become weary of your skill, and you have exhausted the aid which your knowledge can give, and you order them away, send them so far that they will never return. This rule you will find much to your professional credit"!!

Physicians send their patients away, either because they fail to help them from lack of knowledge, or because they wish to get rid of them. It is another thing, however, with re-convalescents. Nothing suits them better than a pleasant journey, if everything is otherwise convenient and comfortable to their circumstances. We conclude with the hope that the reader will have found a fair resumé of what Consumption is, and that enough has been said to enable any one to avoid, if not completely, at least to a great extent, any such difficulty as could be called Consumption, not by change of air, medicine, or similar hocus-pocus, but by a proper knowledge and comprehension of the normal or deranged mechanism of the organ in question.

APPENDIX.

A BRIEF history of the efforts made to introduce to the American profession the results set forth in this book, may not be uninteresting to the reader; illustrating, as it does, how hard it is to be heard under circumstances absolutely chaotic, and how obstinate men come to be in their habitual, traditional code of learning.

My first effort was made in 1858, to introduce the cellular pathology in Boston. A treatise was written, entitled "What is Disease?" and contained what I had previously comprehended from teachers like Henle, Koelliker, Foerster, Virchow, and others. By the advice of a publisher, an appeal was made, in person, to Oliver Wendell Holmes, Prof. of Anatomy at Harvard, for indorsement. He advised me not to publish it, on the ground of its making enemies;— the profession here not being sufficiently advanced to understand it. I was induced, however, to prepare an extract of it for publication in the *Boston Medical and Surgical Journal*, which was refused notwithstanding his indorsement; but on re-appealing to this gentleman I was informed that to introduce such ideas was unbecoming a young man, especially a foreigner, and further, that in America nothing theoretical was wanted; but only that which was practical——?

In 1860, I finished a lecture which delineated the cellular theory in its practical application to tuberculosis. This I wished to demonstrate before the Boston Medical Society, but it was declined for a silly reason. I then decided to give the results in a private lecture, to which I invited the physicians of Boston. In this procedure I was encouraged by Agassiz, who promised me his support, but was prevented from doing so by sickness. On the other hand, I was told by Prof. Wyman, of Cambridge, that he could not encourage me in my purpose, as such a course would endanger his position as professor. I read the lecture, nevertheless, a resumé of which (written by Dr. Hoskins) can be found in the *Boston Courier* of Dec. 10th, 1860. But it proved as Prof. Holmes had predicted, for I was not only not understood, but in consequence of the independent course I had pursued, came into disgrace with what is termed the "old ring" of Boston. Having once entered upon the field, and being sustained by absolute and positively practical results, my failures in the direction indicated only stimulated to increased labor. In 1863 I addressed Dr. H. I. Bowditch, offering to demonstrate the theory and its practical application upon patients. After much useless correspondence, Dr. Bowditch, however, declined the proposition which he himself had made, without giving any reasons therefor, but referred me again to the Boston Medical Society. In 1863 I demonstrated before this body the escape of blood cells (now known as Cohnheim's discovery) into the tissue, forming tubercles, and also the artificial calcification, with

the result of being ridiculed by mutual agreement, and my paper refused by the Medical and Surgical Journal as not practical enough! An attempt to have this paper published in New York was also unsuccessful.

In 1865 I went to the West Indies, where I remained for a year, studying the nature of the prevalent diseases, and climatical variations. The result of these studies has not as yet been published. Having returned to Boston in 1866, Prof. H. R. Storer became interested in the subject, and at his suggestion I prepared a paper for the *American Journal of Medical Sciences* of Philadelphia, which, though especially recommended by him, was, without reason, refused. Mr. Louis Prang, the well-known art publisher, having observed several cases under treatment, caused me to write a popular sketch of this paper, which he published; and although issued in a very neat and attractive form, containing two chromo-lithographic plates illustrative of the theory, the pamphlet neither sold, nor did the ideas seem particularly to impress any one.

Having received anything but professional aid or courtesy in Boston, I went to New York in the spring of 1868, with the purpose of establishing my results in the Bellevue Hospital; but partly owing to the unwillingness of some of the professors, and partly to the fact that Consumptives, if admitted into the hospital at all, were those who were of an incurable character, I did not gain my object. The physicians of St. Luke's Hospital were willing that I should proceed in my undertaking, but being under the supervision of clergymen, "*new experiments*" on patients, on a large scale, could not be made there. Besides, suitable consumptive patients were not admitted to these hospitals, on account of there not being sufficient room, and the impossibility of helping them. Therefore, notwithstanding my most earnest attempt, I failed in my purpose. It was only with very great difficulty that I succeeded in getting four papers published in the *New York Medical Record* of the 1st and 15th of September, the 15th of October, and 15th of December, respectively, of 1868. But these did not command the least comment or interest, although containing nothing but new and important points. Among the various attempts made, and as an illustration of the curious experiences which accompanied my efforts to secure aid in the accomplishment of my purpose, I appealed, in 1868, to Dr. A. Jacoby, Prof. at the College of Physicians and Surgeons, New York, who, on account of being a countryman of mine, and having a reputation in New York as a pathologist, I thought would most likely see the points, and aid me in establishing them. He very readily promised me his aid; but soon after wrote me a letter in which he characterized my views as nonsense, absolutely predicted my professional failure, and advised me to go into the public quack business. But when in the face of all opposition I succeeded in having this nonsense published in the *New York Medical Record*, and asked him to show the greatness of his mental and intellectual faculties and power of reason in exposing it, he very wisely drew in his horns, and begged to be excused. His letters, as rare specimens of professional impudence and utter absence of scientific judgment, are a source of

considerable amusement, especially since this same nonsense has been indorsed and published by the Imperial Medical Faculty of Vienna.

By invitation of Prof. H. R. Storer, I demonstrated the theory of respiration and tubercle formation before his class of physicians, and afterwards before the Gynæcological Society, who twice appointed a committee of investigation on the subject; but without results. By invitation I also demonstrated the same before the Society of Medical Improvement at Cambridge. A report of the lecture can be found in the Journal of the Gynæcological Society of Boston, No. 4, 1869—also a paper on Blood Poisoning, in No. 6, 1869. Although these papers contained views of absolute correctness, and of great importance to the profession, they did not create the smallest degree of interest.

The escape of blood globules, which in 1860 and 1863 I had demonstrated (also published with plates in 1867), and for which I was only laughed at, was afterwards discovered and published in Berlin, by Dr. Cohnheim, indorsed by Virchow, and secured for him a world's reputation; the United States Government having at considerable expense published this important discovery, which, after being publicly demonstrated in the Suffolk District Medical Society, was claimed by myself as being precisely the same thing I had demonstrated in 1863, and for which I was laughed at. I did not, however, receive due credit from this Society. Although thus deprived of the credit of a discovery which by priority legitimately belongs to me, I immediately demonstrated before the same Society my discovery of the true position of the capillary blood-vessels of the lungs, and the consequences resulting from it. Not without difficulty was the Society made to take notice of the matter, and to refer the subject to the section on Microscopy as a proper committee, which consisted of the most educated of the young medical men, all of whom had studied in Europe. To this committee I gave the fullest explanations, and also injected lungs from which to cut sections for examination; nevertheless, they could not see it. Thus my views were again refused by the Boston Medical Society, although on this occasion with a little more professional courtesy and caution. (See *Boston Medical and Surgical Journal*, Feb. No. 2, 1871.) I then wrote to Leipzig, criticising somewhat several views advanced on Consumption, claiming the priority of Cohnheim's discovery, and asking for criticisms of my other advances. This letter can be consulted in Schmidt's Jahrbücher, No. 1, 1871, page 124.

Giving up America as incompetent to judge of scientific medical matters, I appealed, in 1870, to Prof. Brown-Sequard, in Paris. A very kind note was received in reply, stating that if I would send on my views he would cause them to be laid before the Academy, and afterwards noticed in all the French Medical Journals; but before I could get my papers ready the unhappy war broke out, and everything of this kind came to an end in France. The paper, as far as then completed, has since been published in the Journal of the Gynæcological Society of Boston, for June and July 1871.

Dr. F. Steindachner, Curator of the Imperial Cabinet of Natural

History at Vienna, being engaged in examining the rich selections of Agassiz for the Austrian Government, caused me at once to write a paper for Vienna in regard to my views. This first paper can be consulted in the official organ of the medical Faculty of Vienna, *Oesterreichische Zeitschrift fuer praktische Heilkunde*, 1871, No 9. My second paper on the subject containing the anatomy, the mechanism of respiration, and my classification of lung diseases as advanced in this volume, has also been accepted and published by the same Faculty in the same organ, 1872, No. 14.

Thus the views which are here presented, after being treated for years with sneers and contempt in America, are at last brought to the front by the first Medical Faculty of the world. Nor am I the only one who has met with a similar experience. The famous Dr. Marrion Sims of New York was treated in a like manner by his colleagues there for the same views, for which he was honored in Paris. Dr. Horace Green shared the same fate for the introduction of the use of the probang! he was accused in New York of malpractice, while the use of the sponge was recognized as highly useful in certain cases by eminent medical men in Europe, and is in common use to-day. Profs. Brown-Sequard and Storer, and Drs. Hilgard, Spinzig, and other men of eminence, can tell tales of a similar experience. In fact almost every one here who has knowledge and brain enough to make advances in scientific discovery has thus far been treated in a similar way. Disgraceful as this is for the medical profession, it is doubtless but the natural consequence of being under a State or National Government which has of itself no scientific representation by a national academy, with competent and disinterested representatives in all branches of science, whose business it is to investigate the real merit of any advanced views. So long as the fate of scientific discoveries depends upon the fancy and pleasure of private individuals and societies, any scientific devolopment is crushed in its germ by personal envy, professional jealousy, and incapacity of judgment.

INDEX.